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The Philippine Stick Insect genus *Eubulides* Stål, 1877 with the description of a new species from Mt. Apo Range, Mindanao Island (Phasmatodea: Heteropterygidae: Obrimini)

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Abstract

The Philippines is home to three species of *Eubulides* Stål, 1877 distributed in Imugan, Nueva Vizcaya and Polillo Island in Luzon. The first species under the genus, *Eubulides alutaceus* was described by Stål in 1877. The other two species, *E. taylori* and *E. iggorote* were described by Rehn & Rehn in 1939. This paper provides an updated and more detailed description and distribution of *Eubulides* species from the Philippines. A new and endemic species from Mt. Mahuson, Apo Range, North Cotabato is also hereby described and illustrated it represents the fourth species of the genus *Eubulides* from the Philippines and the first species of the genus to be described from Mindanao Island. The new species is distinct from the rest of the *Eubulides* species by the presence of a pair of spinose tubercles in the medial pronotals and postero-median tubercles in the abdominal tergites. The discovery of this new species from Mt. Mahuson provides additional data on the biodiversity in the area and can be used as a basis for proper forest management and policy making to protect the area.

Keywords: *Eubulides manobo, Obriminae, Theramenes-group, Stick Insect, Mt. Mahuson.*

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Introduction

Eubulides Stål, 1877 is a Philippine endemic genus under family Heteropterygidae: Obriminae: Obrimini. The genus belongs to the Theramenes-group as assigned by Hennemann *et al.* (2016) together with *Heterocopus* Redtenbacher, 1906, *Mearnsiana* Rehn & Rehn, 1939 and *Theramenes* Stål, 1875 which are grouped based on the simplicity of their body armature, absence of spines in the posterior mesonotum and metanotum, flattened head, and weakly armed to unarmed and increasingly thickened metafemora (Hennemann *et al.*, 2016). The genus *Eubulides* can be distinguished by the unexpanded meso- and metapleura, weakly armed to unarmed meso- and metanotum of male, presence of median specialization in the 7^{th} - 9^{th} abdominal tergite and up-curving ovipositor in females (Rehn & Rehn, 1939).

Three *Eubulides* species are so far described, *viz. E. alutaceus* Stal, 1877, *E. igorrote* Rhen and Rhen, 1939 and *E. taylori* Rhen and Rhen, 1939 which are restrictedly distributed to Imugan, Nueva Vizcaya in Luzon and Polillo Island (Rehn & Rehn, 1939). No record of the genus is known so far from the Mindanao group of islands though several Obrimini are already recorded. Obrimini species from Mindanao include species of *Brasidas* (4 species), *Euobrimus* (6 species), *Mearnsiana* (1 species), *Stenobrimus* (1 species) and *Tisamenus* (1 species).

Our recent expedition in Mt. Mahuson of the Apo Range in Mindanao during October 2020 resulted in the discovery of a noteworthy

new species of Obrimini in the genus *Eubulides*.

Recent fieldworks conducted by researchers from the Central Mindanao University in different mountain ecosystems in Mindanao Island already resulted to the discovery of several new species in different taxa (Amoroso *et al*., 2020, 2021; Patano *et al*., 2021). Collection sites in these fieldworks included Mt. Mahuson, one of the remaining forested areas in the Apo Range. This forest is continually threatened by habitat loss and degradation caused by over-exploitation of forest resources, conversion of forest into agricultural land and climate change. The discovery of this new species provides significant information on the unknown biodiversity of Mt. Mahuson which can serve as a basis for proper forest management and policy making for the protection and conservation of the area. This paper is specifically aimed to formally describe this new species of *Eubulides* and provide additional information on the morphology and taxonomy of the genus.

Materials and Methods

All recent specimens were collected from Mindanao Island under the Department of Environment and Natural Resources Wildlife Gratuitous Permit (DENR WGP): RXII-2020, No.14.

Examined specimens were from the following institutions:

CMU-CEBREM – Central Mindanao University - Center for Biodiversity Research and Extension in Mindanao.

UPLB-MNH – University of the Philippines - Museum of Natural History, Philippines.

Specimen measurements provided are in millimeters (mm). Glossary used in this manuscript follows Nichols and Schuh (2018), Bragg (1997) for general morphology of Phasmid, Clark-Sellick (1997) for egg morphology and Rehn & Rehn (1939) for acanthotaxy body armatures**.**

Taxonomy

Eubulides alutaceus Stål 1877

Eubulides alutaceus Stål, 1877: lxviii
Eubalides (orthographic/typographical error) *alutaceus* Elera, 1895: vol 2, 200
Eubulides alutaceus Kirby, 1904: 395
Eubulides alutaceus Redtenbacher, 1906: 38
Eubulides alutaceus Bruner, 1915: vol 15, no.2, 229
Eubulides alutaceus Sjöstedt, 1933: vol 25 A, no.16, 2
Eubulides alutaceus Rehn & Rehn, 1939: 403, 407-408
Eubulides alutaceus Zompro, 2004: 209
Eubulides alutaceus Hennemann, *et al*., 2016: 18

Diagnosis: Type species for genus *Eubulides*, with no exact locality in the Philippines. Presently, no other specimen had been collected neither any information regarding the habitat. Foremost distinguishable character is the development of quadrituberculate spines on pronotal anterior margin (Rehn & Rehn, 1939) or equivalent of two pairs of spines at anterior mesal. This character is congeneric, different from other species group, whereas *E. igorrote, E. taylori* and *E. manobo* **sp. n.** has two pairs of anterior mesal at low rounded tubercles.

Eubulides igorrote Rehn & Rehn, 1939

(Fig.1)

Eubulides igorrote Rehn & Rehn, 1939: 403, 408-411, plate 31(fig. 4)
Eubulides igorrote Otte, 1978: 79
Eubulides igorrote Zompro, 1996: 161-164
Eubulides igorrote Sellick, 1998: 208, fig. 8 (c)
Eubulides igorrote Zompro, 2004: 209, fig. 11(5)
Eubulides igorrote Bank *et al*., 2021: 15, 17, fig. 2 (f)

Material examined: 2 males, 1 female, 3 ova [UPLB-MNH-PHA-00632, male, immature] Philippines, Luzon, Mt. Palali, Nueva Vizcaya, 2007, O.L. Eusebio, S.A.Yap & M.V.C. Yngente; [UPLB-MNH-PHA-00633, male] same locality; [UPLB-MNH-PHA-00634, female] same locality with extracted ova.

Recorded specimens: [Hebard Collection, Type no. 1292, male] Holotype, Philippines, Luzon, Nueva Vizcaya, 01 May 1912, W. Boettcher; 1 male, 1 female, Philippines, Luzon, Mt. Banahaw de Tayabas, River Alitao, 600m, 24.VIII.1995, O. Zompro; 1 male, 1 female (L_5), same locality, 29.August.1995. O. Zompro.

Diagnosis: This species is endemic to Luzon Island. Relatively small in size compared to *E. manobo* **sp. n.** Autapomorphic character is the presence of four prominent spinous tubercles on anterior mesonotum. Moreover, apparently more prominent in the male species. Congeneric typically with low pointed tubercles to rounded tubercles.

The egg micropylar lateral extension arms not reaching polar region almost near to *E. manobo* **sp. n.** but differ to *E. taylori* where the extension reaches posterior polar region. Zompro's (1996) descriptions of both sexes including egg agree to every part of characters.

Description: Small sized obrimini; male relatively slender while female stout and longer; female general body surface with dense granular, while male less dense granular; foretibial areolate almost one-eighth shorter than foretibia, distal margin of areolate area on respective tibiae slightly produced to distinctly spinose.

Female: *Head:* longer than wide; eyes projecting almost hemispherical; antennae if bent backwards reaches metanotum, 28 antennomeres, scape longer than wide and dorso-ventrally compressed, pedicel and succeeding flagellomeres subcylindrical; posterior marginal end with median and lateral coronals distinctly spinoso-tuberculate.

Pronotum: Slightly longer than wide; almost one-third shorter than head; antero-lateral spinoso-tuberculate; paired posterior mesal low rounded tubercles; posterior pronotals prominently spinoso-tuberculate.

Mesonotum: Distinctly longer than wide; almost three times longer than pronotum; dorsal lateral outline diverging posteriorly; another spine in line with anterior mesal mesonotals, prominent spinoso-tubercle; anterior mesal slightly shorter spinoso-tubercle; antero-lateral shorter than anterior mesal and with spinoso-tubercle; laterals with series of tubercles.

Metanotum: longer than wide; almost half length of mesonotum; dorsal lateral outline slightly diverging posteriorly; lateral metanotals with series of tubercles.

Abdomen: Median segment dorsally with anterior margin nearly arcuate, median segment towards III abdominal tergites broadening, tergite IV towards supraanal plate gradually converging; tergite VIII and IX with medioposteriors, medioposterior carina on respective tergites apparently elevating and begins at anterior margin apex onwards but terminating before reaching marginal posterior end; supraanal plate as long as tergite IX and anal segment combined, lateral outline arcuate, apex round and not surpassing subgenital plate's apical end; subgenital plate lanceolate, begin projecting at sternite VIII, correspond on lateral outline of supraanal plate, apical end distinctly acute.

Legs: Forefemora almost as long as mesonotum, incurved at anterior half; foretibia slightly shorter than forefemora; probasitarsus almost one-eleventh of foretibia, t2 slightly shorter than probasitarsus; t3 slightly shorter than t2; t4 one-fourth of t3; t5 as long as probasitarsus and t2 combined; mesofemora shorter than forefemora, mesotibia shorter than mesofemora; metafemora longer than forefemora, metatibia slightly longer than metafemora; meso-meta-tarsomeres almost comparable to pro-tarsomeres.

Measurements: Total Length: 58.00; Head: 6.00; Prothorax: 4.20; Mesothorax: 11.70; Metathorax: 5.20; Median Segment: 3.10. Forelegs: Femur: 11.90; Tibia: 11.30. Midlegs: Femur: 9.60; Tibia: 8.80. Hind Legs: Femur: 13.10; Tibia: 13.20.

Male: Similar to female except: Body slenderer and shorter; body surface with granules but less dense; pronotum distinctly longer than wide, dorsal outline gradually converging posteriorly; four spines at mesonotum anterior margin remarkably prominent, median mesonotals tuberculate; dorsal outline of abdominal tergite II to V gently narrowing, tergite VI to VIII gradually widening but tergite IX to anal segment narrowing; anal segment apex retuse; poculum posteriorly projecting almost as length as anal segment, posterior half with median carina, apical margin with flange; forefemora slightly longer than mesonotum; probasitarsus almost one-tenth of foretibia.

Measurements: Total Length: 44.00; Head: 3.80; Prothorax: 3.00; Mesothorax: 9.40; Metathorax: 4.70; Median Segment: 2.20. Forelegs: Femur: 9.80; Tibia: 10.00. Midlegs: Femur: 8.10; Tibia: 7.70. Hind Legs: Femur: 11.50; Tibia: 10.40.

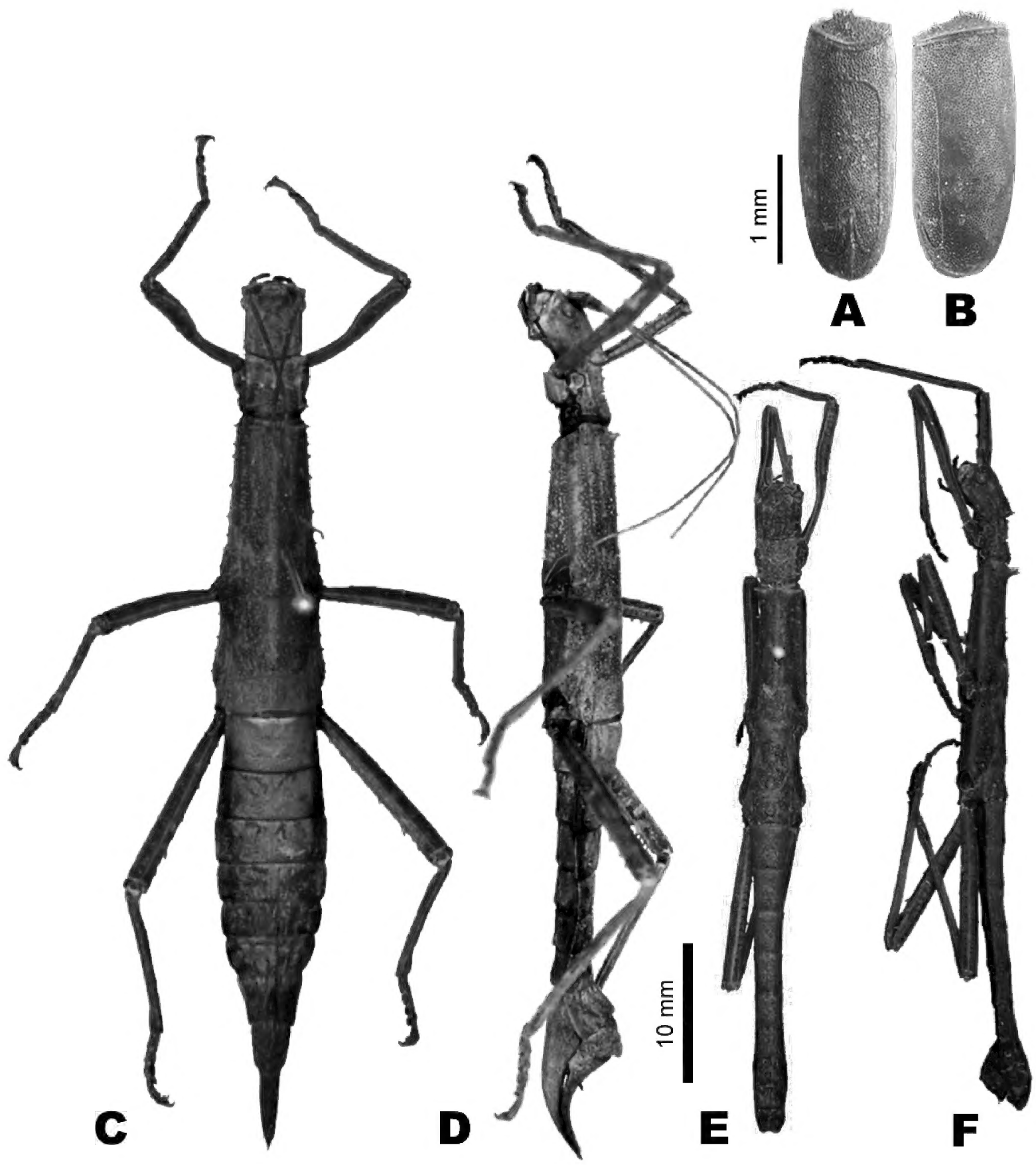

Figure 1. *Eubulides igorrote* Rehn & Rehn, 1939: Egg: (**A**) lateral; (**B**) dorsal; Female: (**C**) dorsal; (**D**) lateral; Male: (**E**) dorsal; (**F**) lateral.

Egg: Capsule bullet-shaped, longer than wide, sub-cylindrical to oval-shaped in cross-section, opercular angle incline downward from ventral side toward dorsal; surface generally punctuate; micropylar anterior margin arcuate, lateral impressions parallel-sided, posteriorly bifid producing two extension extending almost one-third length of micropylar, both extensions projecting posteriorly but not reaching polar region, apically round; micropylar cup distinct; median line distinctly running posteriorly and reaching posterior pole; operculum slightly raised on middle region, almost all middle region overlaid with hair-like forms.

Measurements: Length: 4.3-4.5; Height: 1.8-1.9; Width: 1.5-1.8.

Eubulides taylori Rehn & Rehn 1939
(Fig.2)

Eubulides taylori Rehn & Rehn, 1939: 410 – 412, pl. 31 (figs. 1, 2, 10)
Eubulides taylori Otte, 1978: 79
Eubulides taylori Zompro, 2004: 209
Eubulides taylori Lit & Eusebio, 2008: 121
Eubulides taylori Baker, 2015: 3 & 5

Material examined: 4 males, 4 females: Quezon province, Polillo island: [UPLB-MNH-PHA-00438, female] Brgy. Tamulaya, Sitio Anibong April 2005, M.V.C. Yngente; [UPLB-MNH-PHA-00441, male, immature]

Burdeos, Bulalon, 14°49.72"N, 121°57.90"E, 22-26 October 2003, O.L.Eusebio & I.L.Lit Jr; [UPLB-MNH-PHA-00439, female] Polillo Island, Burdeos, Bulalon, 23-26 October 2003, O.L.Eusebio & I.L.Lit Jr, with extracted ova; [UPLB-MNH-PHA-00470, female] Pinagluba-yan watershed area, April 2010, O.L. Eusebio, with extracted ova; [UPLB-MNH-PHA-00464, male, immature] same latter locality, 7 April 2006, M.V.C. Yngente; [UPLB-MNH-PHA-00437 female] same latter locality, 9 November 2006, M.A.Capricho, with extracted ova; [UPLB-MNH-PHA-00468, male] Puting Bato, Burdeos, 12-15 June 2008, O.L. Eusebio; [UPLB-MNH-PHA-00440, male] Sibulan watershed, 23-27 April 2003, O.L.Eusebio & I.L.Lit Jr.

Recorded specimens: [Hebard Collection, Type no. 1251, female] Holotype, Philippines, Polillo Island, (undated) Taylor; [Hebard Collection, male] Allotype, same as latter data.

Diagnosis: This species can be differentiated from *E. alutaceus* by comparing the pronotal anterior margin armature with two pairs of anterior mesal at the state of distinct tuberculate, whereas *E. taylori* as well as *E. igorrote* and *E. manobo* **sp. n.** has their respective pronotal anterior margin armature reduced to tubercles to low rounded node. It differs from *E. igorrote* for bearing mesonotal margin armature with tuberculated to low round tubercles rather than spinous tubercles. *E. taylori* bears medial pronotals with low rounded tubercles differs to *E. manobo* for having a pair of prominent spines.

The egg micropylar outlines of *E. taylori* is different from *E. igorrote* and *E. manobo* considering that having extensions reaching at posterior pole and apices acute.

Description: Medium sized Obrimini, female relative longer and larger than male; yellowish brown to brown; body surface granulose.

Female: *Head:* longer than wide; eyes projecting hemispherical; antennae if bent backwards reaching median segment, averaging 27 antennomeres, scape longer than wide and dorso-ventrally compressed, pedicel and succeeding flagellomeres subcylindrical and progressively longer; vertex posterior marginal end with median and lateral coronals distinctly rounded spinoso-tuberculate.

Pronotum: longer than wide; shorter than head; anterior margin with anterior mesal and another pair of tubercles forming low tubercles; antero lateral spinoso-tuberculate but posterior mesal bearing low rounded tubercles; posterior pronotals spinoso-tubercles.

Mesonotum: Distinctly longer than wide; about three times longer than pronotum; dorsal lateral outline gradually diverging posteriorly; anterior mesal with one to two pairs of tubercles but more the lateral relatively prominent; median mesonotals low rounded tubercle; series of eight to ten paired low rounded tubercles slightly lateral of median line occupies approximately from anterior fifth to posterior fifth; laterals with series of tubercles.

Metanotum: Longer than wide; almost half of mesonotum; dorsal lateral outline slightly expanding posteriorly; lateral metanotals with series of tubercles.

Abdomen: Median segment wider than long, dorsally anterior margin nearly arcuate; dorsal outline tergite II onwards supraanal plate forming lanceolate; tergite VIII and IX lateral outline on median carina from anterior towards posterior marginal end apparently elevating, tergite IX median carina projecting beyond posterior marginal end; supraanal plate slightly longer than tergite IX and anal segment combined, lateral outline arcuately projecting posteriorly, apex emarginate to broadly round and not surpassing subgenital plate; subgenital plate lanceolate, projecting posteriorly more or less one-fourth longer than supraanal plate, lateral outline arcuately correspond on supraanal plate.

Legs: Forefemora slightly shorter than mesonotum, incurved at anterior half; foretibia shorter than forefemora; probasitarsus seven to eight times shorter than foretibia, t2 slightly shorter than probasitarsus; t3 slightly shorter than t2; t4 approximately one-fourth of t3; t5 as long as probasitarsus and t2 and t4 combined; mesofemora shorter than forefemora; mesotibia shorter than mesofemora; metafemora distinctly longer than forefemora, metatibia shorter than metafemora; meso-meta-tarsomeres more or less as pro-tarsomeres.

Measurements: Total length: 68.65–79.25; Head: 5.65–9.55; Prothorax: 5.50–5.15; Mesothorax: 13.90–15.65; Metathorax: 6.55–7.45; Median segment: 3.20–4.65; Forelegs: Femur: 12.40–13.50; Tibia: 10.80–11.50;

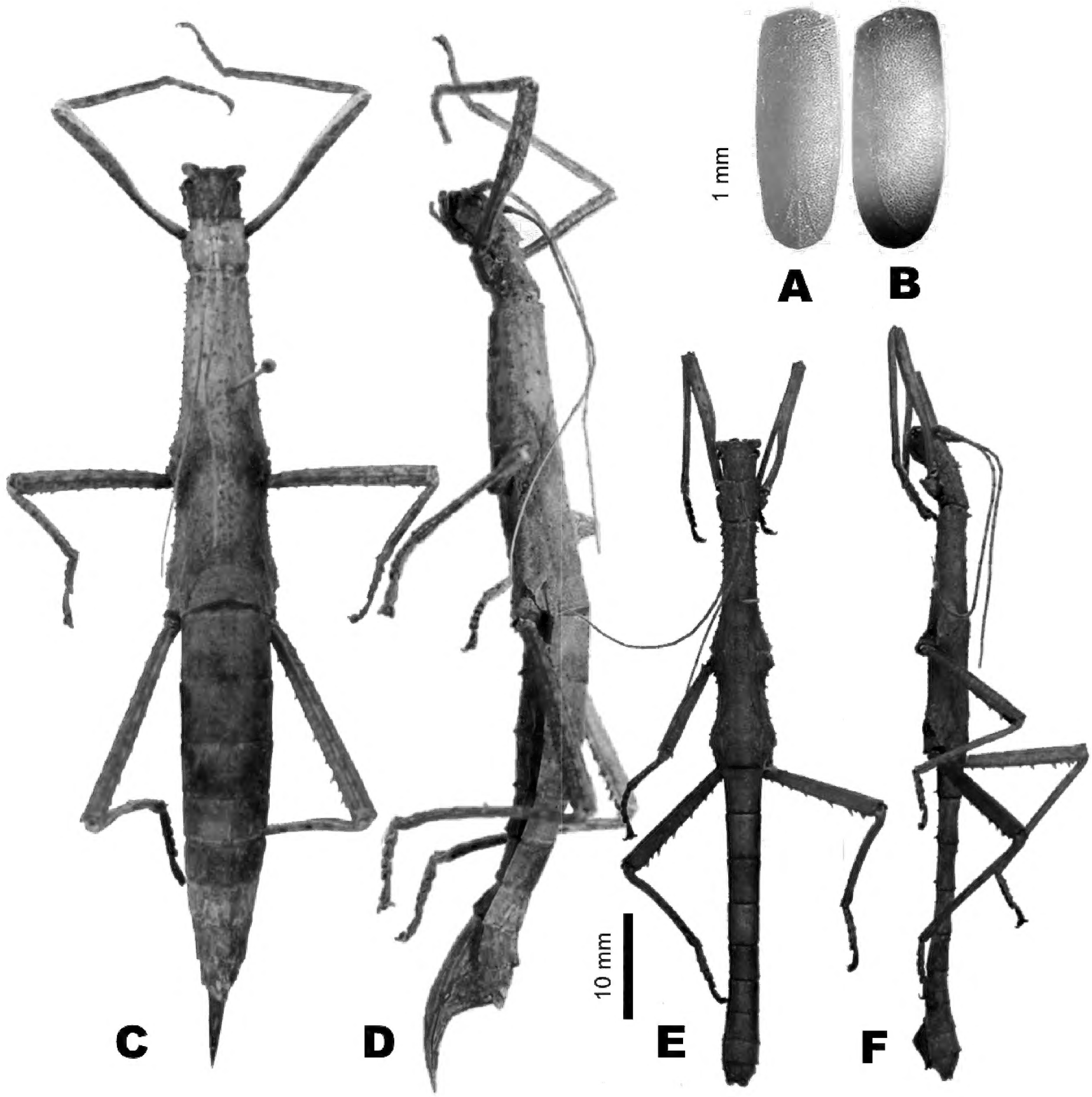

Figure 2. *Eubulides taylori* Rehn & Rehn, 1939: Egg: **(A)** lateral; **(B)** dorsal; Female: **(C)** dorsal; **(D)** lateral; Male: **(E)** dorsal; **(F)** lateral.

Midlegs: Femur: 11.15–11.40; Tibia: 9.45–9.55; Hindlegs: Femur: 15.50–16.50; Tibia: 13.20–13.35.

Male: Most of morphological characters are comparable to female except: Body slenderer and shorter; armature more pronounced; averaging 25 antennomeres; head almost as long or slightly longer than pronotum; dorsal outline from abdominal II to V almost parallel-sided, VI to anal segment gently expanding; tergite VIII and IX with medioposterior tubercle but IX projecting posteriorly; anal segment apex distinctly emarginate; poculum lateral outline navicular; median carina distinct; apical margin with flange.

Measurements: Total length: 55.75–57.40; Head: 4.10–4.95; Prothorax: 3.85–4.15; Mesothorax: 12.05–12.50; Metathorax: 6.40–7.55; Median segment: 3.00–3.15; Forelegs: Femur: 11.10–13.15; Tibia: 10.20–13.00; Midlegs: Femur: 9.60–11.00; Tibia: 8.10–10.00; Hindlegs: Femur: 12.70–13.95; Tibia: 11.10–13.80.

Egg: Bullet-form, longer than wide, dorsal and ventral aspect sub-parallel, cross-section sub-cylindrical to oval-shaped, opercular angle distinctly inclining downward from ventral side towards dorsal; surface generally punctuate; micropylar boundary with impression, almost occupy dorsal area,

anterior margin gently emarginate to weakly arcuate, both laterals border impression run parallel-sided from anterior but gradually sloping and diverging in direction towards latero-posterior, ending and reaching posterior pole, apices acute; micropylar cup distinct placed at posterior fourth, operculum weakly blunt conical form.
Measurements: Length: 4.70– 5.50; Height: 2.02 – 2.15; Width: 1.75– 1.85.

Eubulides manobo Acola, Naredo & Eusebio **sp.n.**
(Fig. 3)

urn:lsid:zoobank.org:act:69BE61D0-74C9-42F5-9C95-78FBA04A2D8E

Material examined: 4 males, 1 female. HOLOTYPE, female: Philippines: Mindanao Island, Mt. Mahuson, Apo Range, Sitio V, Brgy. Mahungkog, Magpet, North Cotabato. (accession no. CMU-MZ 51000). PARATYPES: males: Philippines: Mindanao Island, Mt. Mahuson, Apo Range, Sitio V, Brgy. Mahungkog, Magpet, North Cotabato (Accession no. CMU-MZ 51001, CMU-MZ 51002, CMU-MZ 51003, CMU-MZ 51004).

Diagnosis: *E. manobo* is readily distinguishable from other species of *Eubulides* by the presence of medioposterior tubercles at abdominal tergites, and the prominent pair of spines at medial pronotals.

Morphological character of egg capsule remains synapomorphic to genus *Eubulides* (longer than wide, laterals parallel-sided, resembling bullet form). Capsule shape manifests remarkable similarity to all congeners but comparably smaller from *E. taylori* and larger than *E. igorrote*. Micropylar laterals distinctly different from *E. igorrote* but close to *E. taylori* as lateral arms extensions along most of its length reaches posterior pole while *E. igorrote* lateral arms extensions ends at posterior third. In *E. taylori* micropylar lateral extension arms distinctly reaching posterior pole and extend its length to ventro-posterior of posterior pole while *E. manobo* lateral arms ends near posterior pole.

Description:

Female: *Body*: Relatively smaller compared to other obrimini species, not expanded laterally, smooth to minutely tuberculate in the pronotum, mesonotum, metanotum and abdominal segments. General colour dark brown.
Head: Longer than wide with prominent, yellow, rounded eyes, surface rugose; median and lateral coronals in the occiput spinoso-tuberculate; gulars indistinct; antennae with 28 antennomeres, longer than profemora, almost reaching the median segment.
Pronotum: Longer than wide, surface rugose, pair of distinct spinose median pronotals with smaller supplementary tubercles, transverse sulcus weak, mesal two pairs of smaller less distinct spinose tubercles on each side of the anterior and posterior pronotals, anterior half portion of medial pronotals with pair of prominent spinoso-tuberculate, lateral pronotals rugose; antero and postero-lateral pronotals spinoso-tuberculate, inter-posterior smooth to granulose; prosternum broadly transverse, with two inter-coxal raised sensory areas, general surface slightly rugose with few tubercles at the posterior.
Mesonotum: More than twice as the length of pronotum, surface smooth to minutely granulose; meso-pleura slightly expanded laterally at the posterior; antero-lateral mesonotals spinoso-tuberculate, antero-laterals and anterior mesal with pair of tubercles generally spinose-tuberculate but lower than medial pronotals; lateral mesonotals granulose with 4-6 spinose tubercles; distinct carina running vertically along the tergites of meso, metanotum and median segment; meso-sternum rugose, with four pairs of spinoso-tuberculate meso-sternals; distinct carina run vertically along the meso and meta-sternum.
Metanotum: Twice longer than wide, slightly expanding posteriorly, surface smooth to minutely tuberculate; 2 pairs of spinoso-tuberculate posterior metanotals, less distinct than male; metapleura slightly expanding laterally, rugose with few minute tubercles; metasternum rugose with few minute tubercles.
Abdomen: Median segment rugose, with a postero-median tubercle; generally abdominal tergites smooth to rugose; segments II-V parallel-sided, tergites raised, arched; tergite II with a pair of medioposterior, spinose tubercle; tergites III−V with single medioposterior, spinose-tubercle, size of tubercle is reduced in segment V; segment VI−VII wider than long, tergites flattened; segments VIII−IX slightly narrowed posteriorly; median carina distinct with

medioposteriors; supraanal plate lanceolate, longer than tergite IX and anal segment combined, up-curving, apex rounded, shorter than subgenital plate; subgenital plate lanceolate, acute, up-curving, margins with minute hairs, slightly longer than supraanal plate.

Legs: Forefemora longer than mesonotum, slightly incurved basally, dorsal and median carina distinct, rugose, ventro-anterior carina with three distinct spines; foretibia slightly longer than forefemora, dorsal and ventral carina distinct, rugose with few minute tubercles. Probasitarsus less than one-twentieth of foretibia, longer than wide, t2-t4 shorter than t1, of equal sizes, t5 longer than t1, curved, with short erect hairs; mesofemora almost as long as forefemora, dorsal carina rugose to tuberculate, ventral carina with distinct spines, larger near the distal extremity; mesotibia shorter than mesofemora, dorsal carina weakly tuberculate, ventro-anterior carina with 4-5 small spinose tubercles; mesobasitarsus slightly longer than probasitarsus, longer than wide, t2-t4 shorter than t1, of equal sizes, t5 longer than t1, curved, with short erect hairs; metafemora longer than forefemora, dorsal and median carina tuberculate, ventral carina spinose, spines more distinct than in the pro- and mesofemora; metatibia longer than metafemora, dorsal and marginal carina weakly tuberculate, ventral carina with minute spines; metabasitarsus as long as probasitarsus, t2-t4 shorter than t1, of equal sizes, t5 twice as long as t1, slightly curved basally, with short erect hairs.

Measurements: Total Length: 60.00; Head: 6.00; Prothorax: 4.20; Mesothorax: 9.80; Metathorax: 4.80; Median Segment: 2.70; Forelegs: Femur: 10.10; Tibia: 10.85. Mid-Legs: Femur: 10.00; Tibia: 9.55. Hind Legs: Femur: 13.15; Tibia: 14.00.

Male: *Body*: Relatively small, not expanded laterally, smooth to minutely tuberculate in the pronotum, mesonotum, metanotum and abdominal segments. General colour dark brown, tips of tubercles and spines are yellowish.

Head: Longer than wide; eyes rounded, prominent; surface rugose, lateral and median coronals spinoso-tuberculate, gulars indistinct; antennae with 22 antennomeres, longer than profemora.

Pronotum: Longer than wide, surface rugose; antero-lateral and interposterior tuberculate; a pair of medial pronotals situated on anterior half, pronotal disk right after transverse sulcus, prominent spinoso-tuberculate, more anterior another pair of low rounded tubercles; posterior half with medial pronotals with low rounded tubercles; posterior pronotals supplemented with pair of tubercles situated more anteriorly; generally spinoso-tuberculate but these elements lower than anterior half medials.

Mesonotum: Longer than wide, slightly expanding posteriorly; anterior margin with antero-laterals, anterior mesal and a pair tubercles situated in between both elements, generally spinose-tuberculate, 2 pairs of adjacent spinoso-tuberculate posterior mesonotals, three tuberculate median mesonotals, 4-6 spinoso-tuberculate lateral mesonotals present; distinct carina running vertically along the tergites of mesonotum, metanotum and median segment; meso-sternum rugose, with four pairs of spinoso-tuberculate meso-sternals; distinct carina run vertically along the meso and meta-sternum.

Metanotum: Twice longer than wide, slightly expanding posteriorly; surface rugose; 2 pairs of spinoso-tuberculate posterior metanotals; metapleura slightly expanding laterally, rugose with few minute tubercles; metasternum rugose with few minute tubercles.

Abdomen: Median segment rugose, posterior mesal and first paired posteriors distinctly low rounded tubercles; abdominal tergites generally smooth to rugose, segments II-VI longer than broad, gradually narrowed distally; medioposterior spinose tubercles in tergites II-VI with 2 smaller supplementary tubercles present on each side, spinose-tubercles slightly strong in tergites II-IV and reduced in segments V-VI; pleural segment VII-IX slightly expanding laterally at posteriors with an indistinct carina running vertically along posteriors of segments VII-IX; abdominal sternites rugose with 2 pairs of visible spines in the anteriors and posteriors of each sternites of segments II-VI, sizes of spines decreasing distally; anal segment apex retuse; poculum up-curving, shorter than the anal segment, posterior half with median carina.

Legs: Forefemora longer than mesonotum, incurved basally, dorsal and median carina rugose to minutely tuberculate, ventro-anterior carina spinose; foretibia longer than

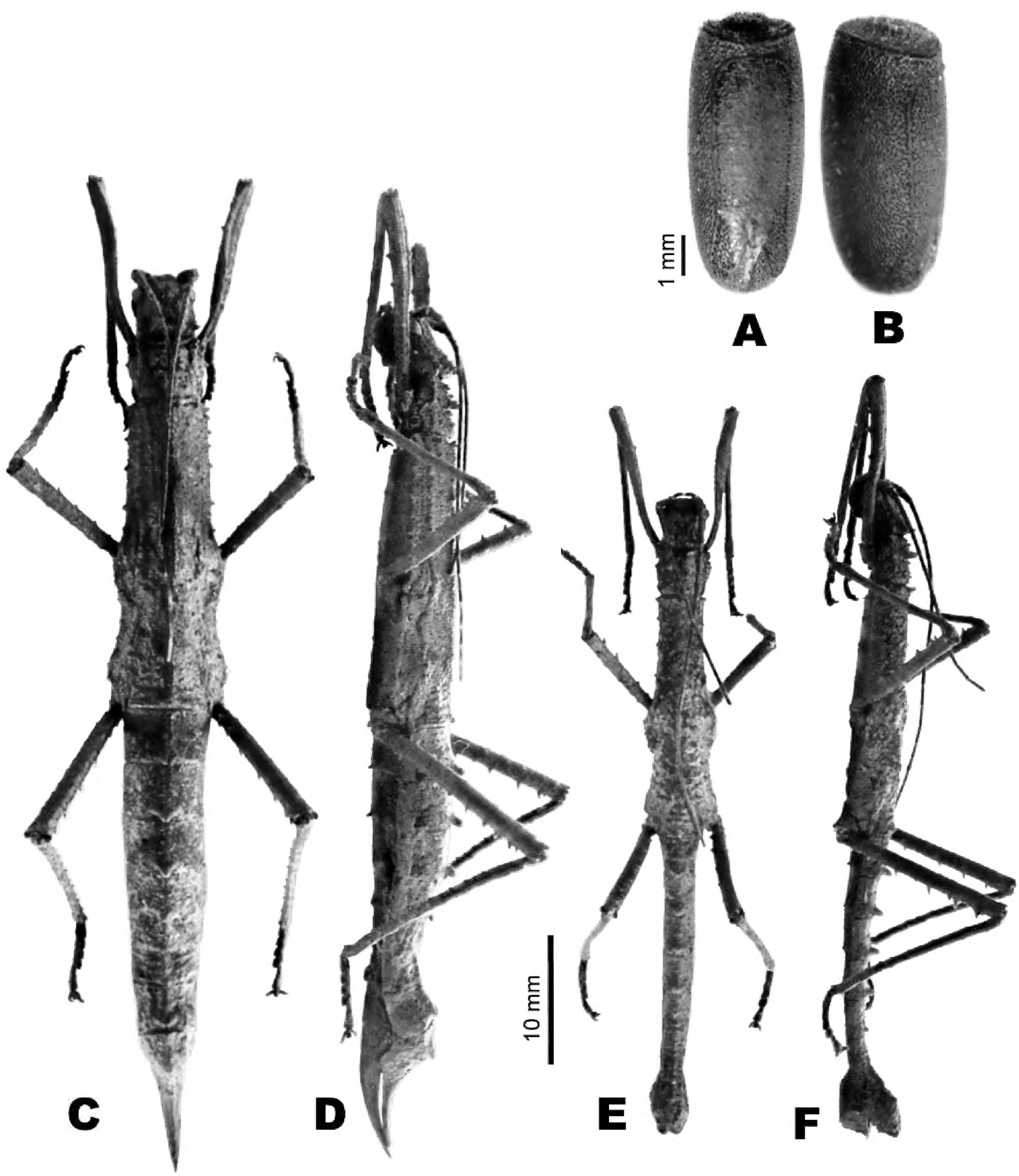

Figure 3. *Eubulides manobo* **sp. n.**: Egg: (**A**) lateral; (**B**) dorsal; Female: (**C**) dorsal; (**D**) lateral; Male: (**E**) dorsal; (**F**) lateral.

forefemora, rugose, carina indistinct, minute hairs present; probasitarsus almost one-eighteenth of foretibia, t2-t4 shorter that t1, of the same sizes, t5 longer than t1, slightly curved with minute hairs; mesofemora shorter than forefemora, dorsal and median carina rugose to tuberculate, ventral carina spinose; mesotibia shorter than mesofemora, rugose to tuberculate, carina indistinct; mesobasitarsus slightly longer than forebasitarsus, t2-t4 shorter than t1, of equal sizes, t5 longer than t1, with minute hairs; metafemora longer than forefemora, dorsal and median carina rugose to tuberculate, ventral carina with distinct spines; metatibia almost as long as metafemora, dorsal and median carina indistinct, rugose to tuberculate, ventral carina with minute spines; metabasitarsus as long as forebasitarsus, t2-t4 shorter that t1, of the same

sizes, t5 longer than t1, slightly curved with minute hairs.
Measurements: Total Length: 41.15; Head: 02.86; Prothorax: 02.30; Mesothorax: 07.56; Metathorax: 03.43; Median Segment: 01.60. Forelegs: Femur: 08.85; Tibia: 09.05. Mid-Legs: Femur: 07.95; Tibia: 06.65. Hind Legs: Femur: 10.05; Tibia: 10.01.

Eggs: Capsule typical *Eubulides*; surface generally punctuate; longer than wide, dorsal aspect almost parallel, ventral gently convex, dorsal view both laterals aspect sub-parallel; cross-section almost round to elliptical; opercular angle distinctly inclined from ventral side downwardly towards dorsal region; micropylar border with distinct fine impression, anterior portion weakly arcuate almost reaching opercular rim, both laterals border impressions continue towards posterior and gently narrowing until reaching posterior fourth of capsule, in line of micropylar cup both borders impression subsequently expanding posteriad, diverging and producing two branches extension, slanting posteriad terminates before posterior pole, apices round; micropylar cup small; median line distinctly extends posteriad and reaching posterior pole; operculum elliptical, practically flat surface, middle portion slightly raised forming ellipsoid mount and overlaid with short curly hair-like form**.**
Measurements: Length: 5.2-5.50; Height: 2.75-3.0; Width: 1.80-2.25.

Keys to species of genus *Eubulides*

Females

1. Medial pronotals with series of tubercles, III to V abdominal tergites without medioposteriors……2
   - Medial pronotals with pair of prominent spines, III to V abdominal tergites with medioposteriors [Mindanao Island] ……..***E. manobo*** Acola, Naredo & Eusebio **sp. n.**
2. Pronotum anterior margin with paired anterior mesal, four large tubercles …….. ***E. alutaceus*** Stål 1877
   - Pronotum anterior margin with paired anterior mesal, two to four small tubercle……...3
3. Anterior mesal mesonotals spinous tubercles and sub-equal the lateral pair [Luzon Island].....***E. iggorote*** Rehn & Rehn, 1939
   - Anterior mesal mesonotals small tubercles and lateral pair larger [Polillo Island]……..***E. taylori*** Rehn & Rehn, 1939

Males

1. Pronotum anterior margin with paired anterior mesal, four large tubercles…….. ……***E. alutaceus*** Stål 1877
   - Pronotum anterior margin with paired anterior mesal, two to four small tubercles ……2
2. Mesonotum anterior margin with very small tubercles [Polillo Island]….***E. taylori*** Rehn & Rehn, 1939
   - Mesonotum anterior margin with large prominent spinous tubercles…….. 3
3. Abdominal tergites with medioposteriors [Mindanao Island]……***E. manobo*** Acola, Naredo & Eusebio **sp. n.**
   - Abdominal tergites without mediopost-eriors [Luzon Island].....***E. iggorote*** Rehn & Rehn, 1939

Discussion

The general body armature of genus *Eubulides* is simple having a flattened head, weakly armed to unarmed mesonotum and metanotum, unexpanded meso- and metapleura, presence of median specialization in the 7th - 9th tergite and up-curving ovipositor in females. Among the species under the Theramenes-group, genus *Eubulides* Stål, 1877 is closely related to *Theramenes*, Stål, 1875 by the strongly up-curving ovipositor but is distinguished by the unexpanded meso-and metapleura, absence of large median tubercle in meso- and metanotum of male and the presence of median specialization in the 7th-9th tergite (Hennemann *et al*., 2016, Rehn & Rehn, 1939). The four described species among the genus *Eubulides* can be distinguished by the differences in the armature of its pronotum, mesonotum and abdominal segments (Table 1). In terms of pronotal morphology, all four species have two pairs of anterior mesal, tuberculate in *E. alutaceus* while low rounded tubercles for *E. igorrote, E. taylori* and *E. manobo* **sp. n.**. The medial pronotals of *E. alutaceus, E. taylori, and E. iggorote* lays bare series of tubercles while *E. manobo* **sp. n.** has a pair of prominent spines and small supplementary tubercles which is distinct for the species. *E. alutaceus* is distinct among the four species for having an unarmed mesonotal

anterior margin in both male and female species (Stål, 1877), the rest of the species have two pairs of spinoso-tubercles in the anterior mesal. Abdominal segments of all species have median specializations in 7th-9th tergite while the presence of postero-median tubercles in the abdominal segments of *E. manobo* distinguishes this species from the rest of the *Eubulides* species.

The tribe Obrimini from Family Heteropterygidae: Obriminae is restricted to the Philippine Islands, Palawan and Northern Borneo, but the great majority of taxa is endemic to the Philippines (Conle, 2006). One member of the tribe is the genus *Eubulides* which is represented by three species (Hennemann *et al*., 2016; Rehn & Rehn, 1939, Stål, 1877). The newly described species herein added the number of *Eubulides* species from the Philippines to four. Also, the new species is the first species of *Eubulides* to be described from Mindanao Island. *E. manobo* was collected from Mt. Mahuson which is one of the remaining unexplored ranges of Mt. Apo. Mt Apo is the Philippines highest peak and is known for its rich flora and fauna including some endemic stick insects such as the site endemic *Mearnsiana bullosa* Rehn & Rehn, 1939, and Mindanao endemic *Spinophetes spinotergum* Zompro & Eusebio, 2000. The other two species of *Eubulides* was described from Luzon regions (Fig. 5). *E. iggorote* was described from Mt. Palali, Nueva Vizcaya and Mt. Banahaw de Tayabas, Quezon Province while *E. taylori* was described from Polillo Island (Hennemann *et al*., 2016; Rehn & Rehn, 1939, Stål, 1877). Meanwhile, *E. alutaceus* has no exact locality described and has never been sighted since its last description by Stål in 1877.

Etymology: The specific epithet is named in honor of the Manobo tribe of Sitio V who are in the frontline in protecting the sacred forests of Mt. Mahuson as part of their ancestral domain.

Distribution and Ecology: Endemic to Mt. Mahuson, Apo Range, Sitio V, Magpet, North Cotabato. The species was collected in a lower montane forest, having *Saurauia* sp. as its host. Other associated trees include *Lithocarpus* sp. and *Shorea astylosa* Foxw. Ferns such as *Angiopteris evecta* (G.Forst.) Hoffm and *Sphaeropteris glauca* (Blume) R.M. Tryon are also abundant in the area where the specimen was collected.

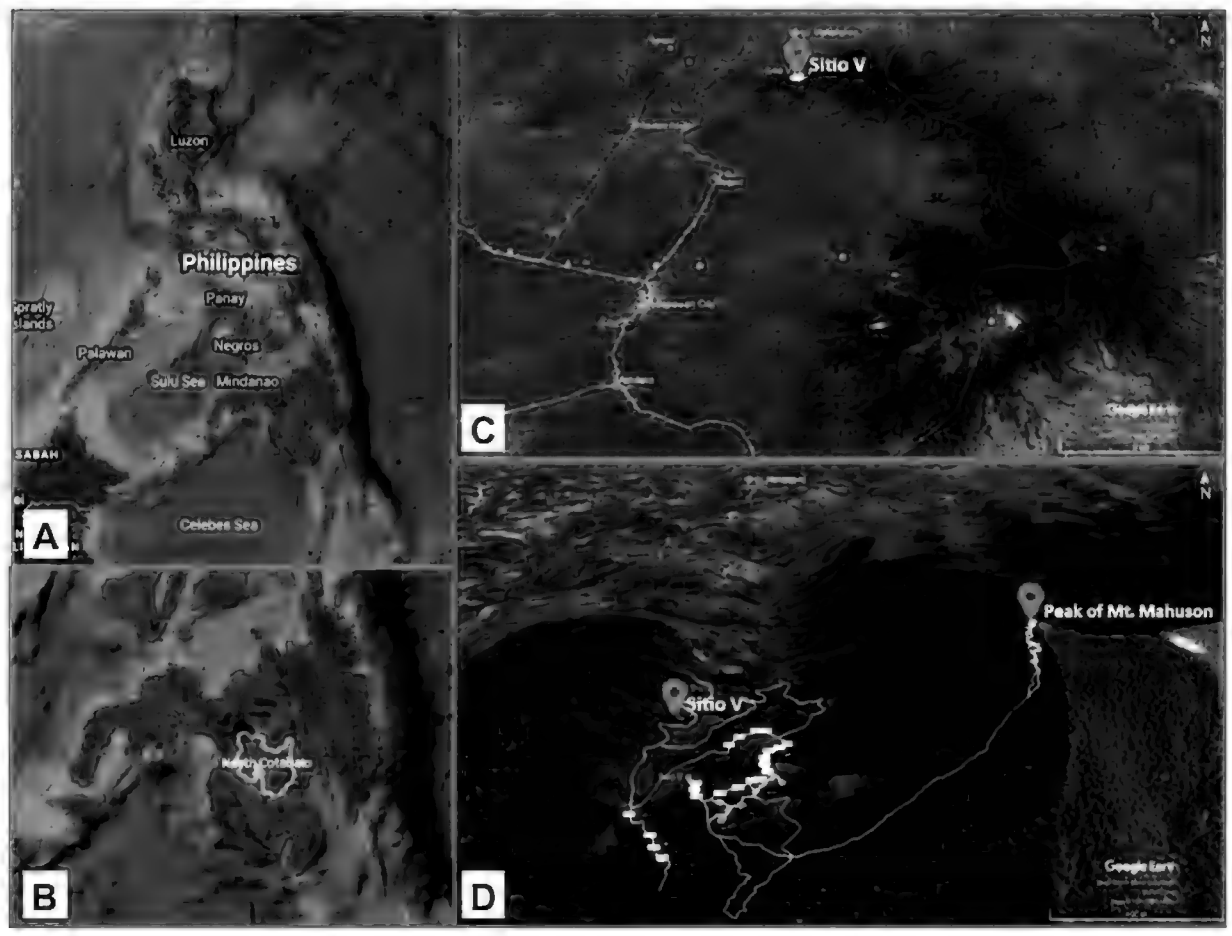

Figure 4. A. Map of the Philippines; **B**. Location of North Cotabato Province in Mindanao, Philippines; **C**. Location of Sitio V; **D**. Location of Sitio V showing the peak of Mt. Mahuson.

Figure 5. Species distribution of *Eubulides* in Philippine Islands: **A**. *E. igorrote,* Mt. Palali, Nueva Vizcaya (upper) and Mt. Banahaw de Tayabas, Quezon Province (lower); **B**. *E. taylori*, Polillo Island, Quezon Province; **C**. *E. manobo* **sp. n.,** Mt. Mahuson, North Cotabato Province.

Table 1. Differential diagnosis of *Eubulides* species

Characteristics	***E. alutaceus***	***E. igorrote***	***E. taylori***	***E. manobo* sp. n.**
♀♂Pronotal anterior margin armature	Two pairs of anterior mesal tubercules	Two pairs of anterior mesal low rounded tubercles	Two pairs of anterior mesal low rounded tubercles	Two pairs of anterior mesal low rounded tubercles
♀♂Medial pronotals	Low rounded series of tubercles	Low rounded series of tubercles	Low rounded series of tubercles	Anterior half with a pair of prominent spines, posterior half small tubercles
♀Mesonotal anterior margin armature	Unarmed (Stål, 1877)	Anterior mesal with two pairs of spinoso-tuberculate	Anterior mesal with two pairs of tubercles, another smaller pair located laterad	Anterior mesal with two pairs of spinoso-tuberculate
♂Mesonotal anterior margin armature	Unarmed (Stål, 1877)	Anterior mesal with two pairs of spinoso-tuberculate	Anterior mesal with a pair of small tubercles, a larger pair located laterad	Anterior mesal with two pairs of spinoso-tuberculate
♀Abdominal terga II to V medioposteriors	Absent	Absent	Absent	Present
Egg capsule micropylar impression	Unknown	Not reaching posterior pole, apices round	Reaching posterior pole, apices acute	Not reaching posterior pole, apices round

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The authors extend their gratitude to the Department of Science and Technology-Grants in-Aid (DOST-GIA) for funding the research; Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) for monitoring this project; Department of Environment and Natural Resources (DENR) for the issuance of gratuitous permit; Local Government Unit (LGU) of the Municipality of Magpet, North Cotabato, Brgy; Mahungkog and Sitio V for the logistics and support; to the local researchers for the help and assistance during the conduct of field work; the Baganis for ensuring the security of the researchers during their stay in Sitio V and to Datu Panguliman Jason Roy Sibug for the coordination and hospitality during the fieldwork; Central Mindanao University (CMU) led by the

University President, Dr. Jesus Antonio G. Derije for the unending support to the CMU researchers. Lastly, the authors from UPLB acknowledge the support from the core funds of the UPLB Museum of Natural History to the on-going studies of Philippine stick insects; the Philippine Terrestrial Arthropod Biodiversity Survey, Dr. Ireneo L. Lit, Jr., Dr. Juan Carlos T. Gonzalez, Dr. Marian P. de Leon and Dr. Jennifer M. Niem for the encouragement and opportunity to undertake the research study. Many thanks also to Dr. Oliver Zompro, Paul D. Brock and Louis N. Sorkin, B.C.E. for providing literature and other information.

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An updated checklist of Mantid fauna (Insecta: Mantodea) of India

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Abstract

A detailed checklist of the order Mantodea in India is presented. A total of 169 species of mantids belonging to 69 genera and 13 families are listed. The families of mantids present in India are; Metallyticidae (1 genus), Eremiaphilidae (8 genera), Rivetinidae (6 genera), Toxoderidae (6 genera), Gonypetidae (9 genera), Haaniidae (2 genera), Empusidae (3 genera), Hymenopodidae (16 genera), Deroplatyidae (3 genera), Mantidae (9 genera), Amorphoscelidae (1 genus), Leptomantellidae (1 genus) and Nanomantidae (4 genera). Classification by Schwarz and Roy, 2019 is followed.

Keywords: *Insecta, Mantodea, Checklist, India.*

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Introduction

Praying mantids have always been a fascinating group of insects for studies. Currently, over 2500 species of mantids under 436 genera and 31 families are recorded in the world (Anderson, 2022; Otte *et al*., 2021). 'The Mantid Fauna of India' (Mukherjee *et al.,* 1995) and the 'Checklist of Mantodea from India' (Mukherjee *et al*., 2014) based on the classification by Beier (1964) and Ehrmann & Roy (2002) respectively are the main references for the taxonomic study of mantid fauna of India. The classification of order Mantodea has been changed recently and there are many changes in the status of genera and species. This work is based on the latest classification by Schwarz and Roy (2019) and includes 169 species of mantids under 69 genera in 13 families and 7 super families known from the country.

Genera and species recently synonymized/ reinstated (Valid name given first)

1. Genus *Anaxarcha* Stål, 1877 = Genus *Oxymantis* Werner, 1931 (Synonymized by Scherbakov, 2022).
2. *Anaxarcha punctillata* (Werner, 1931) = *Oxymantis punctillata* Werner, 1931 (Synonymized by Scherbakov, 2022).
3. Genus *Arria* Stål, 1877 = Genus *Pseudothespis* Mukherjee, 1995 (Synonymized by Schwarz & Roy, 2018).
4. Genus *Caliris* Giglio-Tos, 1915 = Genus *Beesonula* Uvarov, 1939 (Synonymized by Schwarz & Roy, 2018).
5. *Astyliasula inermis* (Wood-Mason, 1879) = *Hestiasula inermis* (Wood-Mason, 1879) (Synonymized by Schwarz & Shcherbakov, 2017).
6. *Caliris pallida* (Werner, 1935) = *Caliris keralensis* (Vyjayandi, Narendran & Mukherjee, 2006) (Synonymized by Schwarz & Roy, 2018).
7. *Catestiasula nitida* (Brunner de Wattenwyl, 1893) = *Hestiasula nitida* (Brunner de Wattenwyl, 1893) (Synonymized by Schwarz & Shcherbakov, 2017).
8. *Creobroter apicalis* Saussure, 1869 = *Creobroter elongatus* Beier, 1929 (Synonymized by Schwarz, Ehrmann, Borer & Monnerat, 2018).
9. *Deiphobe mesomelas* Olivier, 1792 = *Deiphobe incisa* Werner, 1933 (Synonymized by Schwarz, Ehrmann, Borer & Monnerat, 2018).
10. *Deiphobe xanthoptera* (Olivier, 1792) = *Bolivaria xanthoptera* (Olivier, 1792) (Synonymized by Schwarz, Ehrmann, Borer & Monnerat, 2018).

11. *Elmantis lata* Giglio-Tos, 1915 = *Elmantis nira* Mukherjee & Hazra, 1983 (Synonymized by Mukherjee, 2011).
12. *Empusa pennata* (Thunberg, 1815) = *Empusa pauperata* Fabricius, 1781 (Synonymized by Roy, 2004).
13. *Ephestiasula rogenhoferi* (Saussure, 1872) = *Ephestiasula amoena* (Bolivar, 1897) = *Ephestiasula intermedia* Werner, 1930 = *Ephestiasula pictipes* (Wood-Mason, 1879) (Synonymized by Schwarz, Ehrmann, Borer & Monnerat, 2018).
14. *Odontomantis ornata* (Werner, 1935) = *Euantissa ornata* Werner, 1935 (Synonymized by Svenson *et al*., 2015).
15. *Odontomantis pulchra* (Fabricius, 1787) = *Euantissa pulchra* (Fabricius, 1787) (Synonymized by Svenson *et al*., 2015).
16. *Rhombomantis butleri* (Wood-Mason, 1878) = *Rhombodera butleri* Wood-Mason, 1878 (Synonymized by Ehrmann & Borer, 2015).
17. *Rhombomantis tectiformis* (Saussure, 1870) = *Rhombodera tectiformis* Saussure, 1870 (Synonymized by Ehrmann & Borer, 2015).
18. *Rhombomantis woodmasoni* (Werner, 1931) = *Rhombodera woodmasoni* Werner, 1931 (Synonymized by Ehrmann & Borer, 2015).
19. *Statilia nobilis* Brunner de Wattenwyl, 1893 (Reinstated by Schwarz, Ehrmann, Borer & Monnerat, 2018).
20. *Tenodera fasciata blanchardi* (Giglio-Tos, 1912) = *Tenodera blanchardi* Giglio-Tos, 1912 (Synonymized by Ehrmann, 2002).
21. *Tenospilota nova* (Beier, 1930) = *Plistospilota nova* Beier, 1930 (Synonymized by Roy & Ehrmann, 2014).

Taxa recently added to the Mantid fauna of India

1. Genus *Astyliasula* Schwarz & Shcherbakov, 2017
2. Genus *Catestiasula* Giglio-Tos, 1915
3. Genus *Rhombomantis* Ehrmann & Borer, 2015
4. Genus *Tenospilota* Roy & Ehrmann, 2014.
5. *Ephestiasula maculata* Chatterjee, Ghorai, Srinivasan & Mukherjee, 2019
6. *Hestiasula brachyptera* Villani, 2016
7. *Rhombomantis longipennis* Wang, Ehrmann & Borer, 2021
8. *Caliris mukherjeei* Kamila & Sureshan, 2022
9. *Parananomantis fascifemorata* Sureshan, Kamila & Fasano, 2023 (in press)

CLASS INSECTA
ORDER MANTODEA
A. Superfamily METALLYTICOIDEA Giglio-Tos, 1917
I. Family METALLYTICIDAE Giglio-Tos, 1917
Genus *Metallyticus* Westwood, 1835

Metallyticus Westwood, 1835. *Zool. Journ.,* 5: 441.
Metalleutica Burmeister, 1838. *Handb. Entomol.*, 2: 526.

1. ***Metallyticus splendidus*** Westwood, 1835 – India; Kerala. **Elsewhere:** Borneo, Indonesia, Malaysia.
   Metallyticus splendidus Westwood, 1835. *Zool. Journ.*, 5: 442.
   Metallyticus splendidus var. *viridi-auratus* Westwood, 1889. *Rev. Mantid.,* 1.
2. ***Metallyticus violaceus*** Burmeister, 1838 – India; Kerala. **Elsewhere:** Borneo, Indonesia, Malaysia, Myanmar, Philippines.
   Metalleutica violacea Burmeister, 1838. *Handb. Entomol.,* 2: 527.
   Metalleutica vitripennis Burmeister, 1838. *Handb. Entomol.*, 2: 527.
   Mantis chalybea Audinet-Serville, 1839. *Hist. Ins. Orth.*, 202.
   Metallyticus splendidus var. *purpureus* Westwood, 1889. *Rev. Mantid.*, 1.

B. Superfamily EREMIAPHILOIDEA Saussure, 1869
II. Family EREMIAPHILIDAE Saussure, 1869
Subfamily Eremiaphilinae
Genus *Eremiaphila* Lefebvre, 1835

Eremiaphila Lefebvre, 1835. *Annls. Soc. Ent. Fr.,* 4: 468.
Eremophila Burmeister, 1838. *Handb. Entomol.,* 2: 524.
Centromantis Werner, 1904. *Anz. Akad. Wiss. Wien.,* 41(27): 404.

3. ***Eremiaphila irridipennis*** Mukherjee & Hazra, 1985 – India; Gujarat.
   Eremiaphila irridipennis Mukherjee & Hazra, 1985. *Entomon.,* 10(3): 245.

Subfamily Iridinae

Tribe Didymocoryphini

Genus *Didymocorypha* Wood-Mason, 1877

Didymocorypha Wood-Mason, 1877. *Annls. Mag. Nat. Hist.*, 19(4): 221.
Pyrgocotis Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.,* 4(10): 14.

4. ***Didymocorypha lanceolata*** (Fabricius, 1798) – India; Andhra Pradesh, Bihar, Chhattisgarh, Goa, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh, West Bengal. **Elsewhere:** Nepal, Sri Lanka, Thailand.
   Mantis lanceolata Fabricius, 1798. *Ent. Syst.*, 191.
   Schizocephala (Didymocorypha) ensifera Wood-Mason, 1877. *Annls. Mag. Nat. Hist.*, 19(4): 221.
   Pyrgocotis gracilipes Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.,* 4(10): 17.

Tribe Dysaulini

Genus *Dysaules* Stål, 1877

Dysaules Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.,* 4(10): 14.
Parepiscopus Wood-Mason, 1889. *Cat. Mant.*, 39.

5. ***Dysaules himalayanus*** Wood-Mason, 1889 – India; Chhattisgarh, Himachal Pradesh, Madhya Pradesh, Maharashtra. **Elsewhere**: Nepal.
   Dysaules himalayanus Wood-Mason, 1889. *Cat. Mant.,* 42.
6. ***Dysaules longicollis*** Stål, 1877 – India; Karnataka, Maharashtra, Tamil Nadu, West Bengal.
   Dysaules longicollis Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 18.
   Dysaules longicollis var. *brevipennis* Wood-Mason, 1882. *J. Asiat. Soc. Bengal.,* 51(2): 25.
   Parepiscopus hampsoni Wood-Mason, 1889. *Cat. Mant.*, 40.

Genus *Dysaulophthalma* Stiewe, 2009

Dysaulophthalma Stiewe, 2009. *Ent. Mon. Mag.*, 145: 52.

7. ***Dysaulophthalma nathani*** Stiewe, 2009 – India; Kerala, Tamil Nadu.
   Dysaulophthalma nathani Stiewe, 2009. *Ent. Mon. Mag.*, 145: 51.

Genus *Oxyophthalma* Saussure, 1861

Oxyophthalmus Saussure, 1861. *Annls. Soc. Ent. Fr.,* 1(4): 469.
Oxyophthalma Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 59.

8. ***Oxyophthalma engaea*** (Wood-Mason, 1889) – India; Andhra Pradesh, Kerala, Tamil Nadu. **Elsewhere:** Sri Lanka.
   Oxyophthalmus engaeus Wood-Mason, 1889. *Cat. Mant.*, 37.
9. ***Oxyophthalma gracilis*** Saussure, 1861 – India; Karnataka, Tamil Nadu. **Elsewhere:** Sri Lanka.
   Oxyophthalmus gracilis Saussure, 1861. *Annls. Soc. Ent. Fr.*, 1(4): 470.

Tribe Iridini

Genus *Iris* Saussure, 1869

Iris Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 64.

10. ***Iris nana*** Uvarov, 1930 – India; Punjab, Rajasthan. **Elsewhere:** Afghanistan, Balochistan, Iran, Iraq, Pakistan.
    Iris nana Uvarov, 1930. *Annls. Mag. Nat. Hist.*, 5(10): 632.
    Iris radians Uvarov, 1931. *Annls. Mag. Nat. Hist.,* 8(10): 234.
11. ***Iris oratoria*** (Linne, 1758) – India. **Elsewhere:** Albania, Algeria, Crete, Croatia, Cyprus, Egypt, France, Greece, Iran, Israel, Italy, Jordan, Morocco, Pakistan, Palestine, Romania Spain, Syria, Chad, Tunisia, Turkey, United States of America.
    Gryllus (Mantis) oratorius Linne, 1758. *Syst. Nat.,* 10: 426.
    Mantis bella Germar, 1817. *Fauna. Ins. Eur. Fasc.,* 6.
    Mantis dentata Goeze, 1778. *Ent. Beitrag.,* 2: 36.
    Mantis minima Charpentier, 1825. *Horae. Ent.*, 91.
12. ***Iris orientalis*** Wood-Mason, 1882 – India; Himachal Pradesh, Rajasthan. **Elsewhere:** Afghanistan, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Java, Jordan, Morocco, Nepal, Pakistan, Portugal, Spain, Mallorca, Tunisia, Turkey, United States of America.

Iris orientalis Wood-Mason, 1882. *J. Asiat. Soc. Bengal.*, 51(2): 32.

Tribe Schizocephalini

Genus *Schizocephala* Serville, 1831

Schizocephala Audinet-Serville, 1831. *Annls. Sci. Nat.,* 22: 55.

13. ***Schizocephala bicornis*** (Linne, 1758) – India; Andhra Pradesh, Bihar, Chhattisgarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Nepal, Sri Lanka, Sunda Island, Thailand.
    Gryllus (Mantis) bicornis Linne, 1758. *Syst. Nat.*, 10: 1- 426.
    Mantis bicornis Linne, 1767. *Syst. Nat.*, 2: 1(2): 691.
    Mantis oculata Fabricius, 1781. *Spec. Ins.,* 1: 348.
    Mantis stricta Olivier, 1792. *Enc. Meth. Ins.,* 7: 641.

Subfamily Parathespinae

Genus *Parathespis* Saussure, 1869

Parathespis Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 58.

14. ***Parathespis humbertiana*** Saussure, 1869 – India; Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Odisha, Tamil Nadu. **Elsewhere:** Sri Lanka.
    Parathespis humbertiana Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 71.

III. Family RIVETINIDAE Ehrmann & Roy, 2002

Subfamily Deiphobinae

Tribe Cotigaonopsini

Genus *Cotigaonopsis* Vyjayandi, 2009

Cotigaonopsis Vyjayandi, 2009. *Genus.*, 20(3): 487.

15. ***Cotigaonopsis providenceae*** Vyjayandi, 2009 – India; Goa.
    Cotigaonopsis providenceae Vyjayandi, 2009. *Genus.*, 20(3): 487.

Tribe Deiphobini

Genus *Deiphobe* Stål, 1877

Deiphobe Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 33.
Sphendale Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 34.

16. ***Deiphobe brevipennis*** Sjöstedt, 1930 – India; Himachal Pradesh, Maharashtra.
    Deiphobe brevipennis Sjöstedt, 1930. *Ark. Zool.,* 21A(32): 31.
17. ***Deiphobe brunneri*** (Saussure, 1871) – India; Himachal Pradesh, Manipur, Uttar Pradesh. **Elsewhere:** Laos, Nepal, Thailand.
    Iris (Fischeria) brunneri Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21: 304.
    Eremoplana microptera Westwood, 1889. *Revis. Mantid.*, 9: 32.
18. ***Deiphobe indica*** Giglio-Tos, 1916 – India; Himachal Pradesh, Madhya Pradesh, Maharashtra, Uttar Pradesh.
    Deiphobe indica Giglio-Tos, 1916. *Bull. Soc. Entomol. Ital.,* 47: 25.
19. ***Deiphobe infuscata*** (Saussure, 1870) – India; Andhra Pradesh, Bihar, Chhattisgarh, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh. **Elsewhere:** Nepal, Sri Lanka.
    Phasmomantis infuscata Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3(5): 235.
    Thespis ocellata Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21: 278.
20. ***Deiphobe longipes*** Werner, 1926 – India; East.
    Deiphobe longipes Werner, 1926. *Societas. Ent.,* 41(5): 18.
21. ***Deiphobe mesomelas*** (Olivier, 1792) (= *Deiphobe incisa* Werner, 1933) – India; Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh, West Bengal. **Elsewhere:** Myanmar, Nepal.
    Mantis mesomelas Olivier, 1792. *Enc. Meth. Ins.*, 7: 635.
    Sphendale robusta Kirby, 1904. *Ann. Nat. Hist.,* 269.
    Deiphobe incisa Werner, 1933. *Proc. Zool. Soc. Lond.,* 900-901.
    Deiphobe yunnanensis Tinkham, 1937. *Lingnan. Sci. J.,* 16: 561.
22. ***Deiphobe xanthoptera*** (Olivier, 1792) [= *Bolivaria xanthoptera* (Olivier, 1792)] – India; North. Elsewhere: Afghanistan, Iran, Tajikistan, Kazakhstan, Nepal.

Mantis xanthoptera Olivier, 1792. *Enc. Meth., Ins.,* 7: 637.
Mantis ochroptera Lichtenstein, 1802. *Trans. Linn. Soc. Lond.*, 6: 29.

Genus *Deiphobella* Giglio-Tos, 1916

Deiphobella Giglio-Tos, 1916. *Bull. Soc. Ent. Italy.,* 47: 26.

23. ***Deiphobella gardneri*** Werner, 1935 – India; Uttar Pradesh.
Deiphobella gardneri Werner, 1935. *Proc. Zool. Soc. Lond.,* 496.
24. ***Deiphobella laticeps*** (Wood-Mason, 1876) – India; Andhra Pradesh, Karnataka, Kerala, Maharashtra. **Elsewhere:** Sri Lanka.
Fischeria laticeps Wood-Mason, 1876. *Annls. Mag. Nat. Hist.*, 18(4): 337.
Eremoplana laticeps Kirby, 1904. *Syn. Cat. Orth.*, 1: 266.

Genus *Indothespis* Werner, 1935

Indothespis Werner, 1935. *Proc. Zool. Soc. Lond.*, 497.

25. ***Indothespis assamensis*** Werner, 1935 – India; Assam.
Indothespis assamensis Werner, 1935. *Proc. Zool. Soc. Lond.*, 497.

Subfamily Rivetininae
Tribe Rivetinini
Genus *Pararivetina* Beier, 1931

Pararivetina Beier, 1931. *Ann. Mag. Nat. Hist.,* 10(7): 361.

26. ***Pararivetina fraseri*** Beier, 1931 – India; Tamil Nadu.
Pararivetina fraseri Beier, 1931. *Ann. Mag. Nat. Hist.,* 10(7): 361.

Genus *Rivetinula* La Greca, 1977

Rivetinula La Greca, 1977. *Animalia.*, 4(1-2): 23.

27. ***Rivetinula fraterna*** (Saussure, 1871) – India; Maharashtra. **Elsewhere:** Saudi Arabia.
Iris (Fischeria) fraterna Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.,* 21(1): 109.

IV. Family TOXODERIDAE Saussure, 1869
Subfamily Oxyothespinae
Tribe Heterochaetulini
Genus *Heterochaetula* Wood-Mason, 1889

Heterochaetula Wood-Mason, 1889. *J. Asiat. Soc. Bengal.,* 58(3): 308.
Cheddikulama Henry, 1932. *Spolia Zeylan.,* 17(1): 13.

28. ***Heterochaetula fissispinis*** Wood-Mason, 1889 – India; Andhra Pradesh, Goa, Karnataka, Kerala, Maharashtra, Odisha, Uttar Pradesh. **Elsewhere:** Laos, Thailand.
Heterochaetula fissispinis Wood-Mason, 1889. *J. Asiat. Soc. Bengal.,* 58(3): 309.
Cheddikulama straminea Henry, 1932. *Spolia Zeylan.,* 17(1): 14.
29. ***Heterochaetula tricolor*** (Wood-Mason, 1876) - India- Bihar, Maharashtra, Odisha, West Bengal. **Elsewhere:** Thailand.
Heterochaeta tricolor Wood-Mason, 1876. *Annls. Mag. Nat. Hist.,* 4(108): 441.

Subfamily Toxoderinae
Tribe Aethalochroini
Genus *Aethalochroa* Wood-Mason, 1877

Aethalochroa Wood-Mason, 1877. *Annls. Mag. Nat. Hist.*, 19(4): 308.
Arsacia Stål, 1877. *Bih. K. Svenska. Verensk. Akad. Handl.*, 4(10): 70.
Arsaria Brunner De Wattenwyl, 1893. *Annali. Mus. Civ. Stor. Nat. Genova.*, 13(33): 74.
Arteria Kirby, 1904. *Syn. Cat. Orth.,* 1: 308.
Loxomantis Giglio-Tos, 1914. *Annuar. Mus. Zool. Univ. Napoli (N.S.).,* 4(15): 12.

30. ***Aethalochroa ashmoliana*** (Westwood, 1841) – India; Andhra Pradesh, Chhattisgarh, Karnataka, Kerala, Maharashtra, Odisha, Uttar Pradesh, West Bengal. **Elsewhere:** Malaysia, Sri Lanka, Thailand.
Vates ashmolianus Westwood, 1841. *Ann. Mag. Nat. Hist.*, 8(1): 272.
Arsacia ashmoliana Stål, 1877. *Bih. K. Svenska. Verensk. Akad. Handl.*, 4(10): 75.
Aethalochroa ashmoliana var. *insignis* Wood-Mason, 1878. *Proc. Zool. Soc. Lond.*, 38: 584.
Aethalochroa ashmoliana var. *simplicipes* Wood-Mason, 1878. *Proc. Zool. Soc. Lond.*, 38: 584.
Loxomantis indica Giglio-Tos, 1914. *Annuar. Mus. Zool. Univ. Napoli (N.S.).,* 4(15): 12.

Tribe Calamothespini

Subtribe Toxomantina

Genus *Toxomantis* Giglio-Tos, 1914

Toxomantis Giglio-Tos, 1914. *Annuar. Mus. Zool. Univ. Napoli (N.S.).*, 4(15): 10.

31. ***Toxomantis westwoodi*** Giglio-Tos, 1914 – India; Karnataka.
Toxodera (Paradanuria) orientalis Westwood, 1889. *Revis. Mantid.*, 41.
Toxomantis westwoodi Giglio-Tos, 1914. *Annuar. Mus. Zool. Univ. Napoli (N.S.).*, 4(15): 11.

Tribe Toxoderopsini

Genus *Euthyphleps* Wood-Mason, 1889

Euthyphleps Wood-Mason, 1889. *J. Asiat. Soc. Bengal.*, 58(3): 315.

32. ***Euthyphleps curtipes*** (Westwood, 1889) – India; Maharashtra.
Toxodera (Paradanuria) curtipes Westwood, 1889. *Revis. Mantid.*, 41.
33. ***Euthyphleps rectivenis*** Wood-Mason, 1889 – India; Himachal Pradesh. **Elsewhere:** Nepal.
Euthyphleps rectivenis Wood-Mason, 1889. *J. Asiat. Soc. Bengal.*, 58(3): 317.

Genus *Toxodanuria* Uvarov, 1940

Toxodanuria Uvarov, 1940. *Ann. Mag. Nat. Hist.*, 6: 115.

34. ***Toxodanuria orientalis*** (Wood-Mason, 1877) – India; Karnataka.
Paradanuria orientalis Wood-Mason, 1877. *Annls. Mag. Nat. Hist.*, 19(4): 220.
35. ***Toxodanuria parvula*** (Westwood, 1889) – India.
Toxodera (Paradanuria) parvula Westwood, 1889. *Revis. Mantid.*, 41.

Genus *Toxoderopsis* Wood-Mason, 1889

Toxoderopsis Wood-Mason, 1889. *J. Asiat. Soc. Bengal.*, 58(3): 317.

36. ***Toxoderopsis spinigera*** Wood-Mason, 1889 – India; Gujarat, Kerala, Maharashtra. **Elsewhere:** Sri Lanka.
Toxoderopsis spinigera Wood-Mason, 1889. *J. Asiat. Soc. Bengal.*, 58(3): 319.
37. ***Toxoderopsis taurus*** Wood-Mason, 1889 – India; Andhra Pradesh, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Telangana, Uttar Pradesh. **Elsewhere:** Pakistan, Thailand.
Toxoderopsis taurus Wood-Mason, 1889. *J. Asiat. Soc. Bengal.*, 58(3): 320.

C. Superfamily GONYPETOIDEA Westwood, 1889

V. Family GONYPETIDAE Westwood, 1889

Subfamily Gonypetinae

Tribe Gonypetini

Subtribe Gonypetina

Genus *Elmantis* Giglio-Tos, 1915

Elmantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 161.

38. ***Elmantis domestica*** Vyjayandi & Rajeesh, 2006 – India; Karnataka, Kerala.
Elmantis domestica Vyjayandi & Rajeesh, 2006. *Entomon*, 31(4): 327.
39. ***Elmantis lata*** Giglio-Tos, 1915 (= *Elmantis nira* Mukherjee & Hazra, 1983) – India; Karnataka, Maharashtra. **Elsewhere:** Sri Lanka.
Elmantis lata Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 162.
Elmantis nira Mukherjee & Hazra, 1983. *Rec. Zool. Surv. India,* 80(3-4): 462.
40. ***Elmantis trincomaliae*** (Saussure, 1869) – India; Andhra Pradesh, Chhattisgarh, Goa, Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh. **Elsewhere:** Sri Lanka.
Gonypeta trincomaliae Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 63.
Gonypeta vicina Bolivar, 1897. *Ann. Soc. Ent. Fr.*, 66: 307.

Genus *Gimantis* Giglio-Tos, 1915

Gimantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 161.
Eumantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 160.

41. ***Gimantis assamica*** (Giglio-Tos, 1915) – India; Assam, Odisha, Tamil Nadu.
Eumantis assamica Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 161.
42. ***Gimantis authaemon*** (Wood-Mason, 1882) – India; Kerala, Meghalaya. **Elsewhere:** Malaysia, Myanmar, Thailand.
Gonypeta authaemon Wood-Mason, 1882. *J. Asiat. Soc. Bengal.*, 51(2): 26.

Genus *Gonypeta* Saussure, 1869

Gonypeta Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 55.

43. ***Gonypeta punctata*** (De Haan, 1842) – India; Himachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu, Telangana, Uttar Pradesh. **Elsewhere:** Indonesia, Malaysia, Myanmar, Sri Lanka, Thailand.
Mantis (Oxypilus) punctata De Haan, 1842. *Verh. Nat. Gesch. Nederl. Bezitt. Ins.*, 85.

Genus *Memantis* Giglio-Tos, 1915

Memantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 163.

44. ***Memantis fuliginosa*** (Thunberg, 1815) - India. **Elsewhere:** Myanmar, Nepal, Singapore, Sri Lanka.
Mantis fuliginosa Thunberg, 1815. *Mem. Acad. Sci. St. Petersb.*, 5: 291.
Gonypeta femorata Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3(5): 230.
Humbertiella consobrina Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21: 273.
45. ***Memantis gardneri*** Werner, 1935 – India; Andaman Island, Madhya Pradesh, Uttar Pradesh. **Elsewhere:** Nepal.
Memantis gardneri Werner, 1935. *Proc. Zool. Soc. Lond.*, 496.
46. ***Memantis minor*** Werner, 1931- India; Andhra Pradesh, Kerala. **Elsewhere:** Nepal.
Memantis minor Werner, 1931. *Proc. Zool. Soc. Lond.*, 1330.
47. ***Memantis yercaudensis*** Vyjayandi, Rajeesh & Sajin, 2010 – India; Tamil Nadu.
Memantis yercaudensis Vyjayandi, Rajeesh & Sajin John, 2010. *Entomon*, 35(4): 257.

Subtribe Gonypetyllina

Genus *Gonypetyllis* Wood-Mason, 1891

Gonypetyllis Wood-Mason, 1891. *Cat. Mant.*, 67.
Haldwania Beier, 1930. *Ann. Mag. Nat. Hist.*, 10(6): 440.
Paula Liana, 2009. *Annales Zoologici*, 59(3): 287.

48. ***Gonypetyllis semuncialis*** Wood-Mason, 1891 – India; Chhattisgarh, Gujarat, Maharashtra, Uttar Pradesh, West Bengal. **Elsewhere:** Indonesia, Nepal.
Gonypetyllis semuncialis Wood-Mason, 1891. *Cat. Mant.*, 67.

Subtribe Humbertiellina

Genus *Humbertiella* Saussure, 1869

Humbertiella Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 55.
Theopompula Giglio-Tos, 1917. *Bull. Soc. Ent. Ital.*, 48: 84.

49. ***Humbertiella affinis*** Giglio-Tos, 1917 – India; Karnataka, Kerala, Maharashtra, Odisha. **Elsewhere:** Pakistan, Sri Lanka.
Humbertiella affinis Giglio-Tos, 1917. *Bull. Soc. Ent. Ital.*, 48: 83.
50. ***Humbertiella ceylonica*** Saussure, 1869 – India; Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Myanmar, Nepal, Sri Lanka, Thailand.
Humbertiella ceylonica Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 62.
Theopompa septentrionum Wood-Mason, 1891. *Cat. Mant.*, 64.
51. ***Humbertiella indica*** Saussure, 1869 – India; Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh. **Elsewhere:** Myanmar, Nepal, Pakistan, Sri Lanka.
Humbertiella indica Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 62.
52. ***Humbertiella modesta*** Laidlaw, 1937 – India; Jharkhand (Present status unknown).
Humbertiella modesta Laidlaw, 1937: *Ent. Mon. Mag.*, 80: 225.
53. ***Humbertiella nigrospinosa*** Sjöstedt, 1930 – India; Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh.
Humbertiella nigrospinosa Sjöstedt, 1930. *Ark. Zool.*, 21A(32): 18.
54. ***Humbertiella similis*** Giglio-Tos, 1917 – India; Chhattisgarh, Goa, Himachal Pradesh, Jammu, Karnataka, Kerala, Madhya Pradesh, Odisha, Tamil Nadu, Uttar Pradesh. **Elsewhere:** Nepal, Sri Lanka.
Humbertiella similis Giglio-Tos, 1917. *Bull. Soc. Ent. Ital.*, 48: 83.

Genus *Theopompa* Stål, 1877

Theopompa Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4: 21.

55. ***Theopompa ophthalmica*** (Olivier, 1792) – India; South-East India. **Elsewhere:** Indonesia, Sunda Island, Taiwan, Vietnam.

Mantis ophthalmica Olivier, 1792. *Enc. Meth., Ins.*, 7: 637.
Mantis grisea Lichtenstein, 1802. *Trans. Linn. Soc. Lond.*, 6: 29.
Mantis oratoria Stoll, 1813. *Represent. Spectres. Mantes.*, 77.
Theopompa cambodiensis Westwood, 1889. *Revis. Mantid.*, 29.
Theopompa blanchardi Wood-Mason, 1891. *Cat. Mant.*, 62.

56. ***Theopompa servillei*** (De Haan, 1842) – India; Arunachal Pradesh, Eastern and Southern India. **Elsewhere:** Borneo, Indonesia, Myanmar, Peninsular Malaysia, Sunda Island, Thailand.
Mantis (Mantis) servillei De Haan, 1842. *Verh. Nat. Gesch. Neder. Bezitt. Ins.*, 81.

Subfamily Iridopteryginae
Tribe Amantini
Genus *Amantis* Giglio-Tos, 1915

Amantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 151.
Cimantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 154.
Shirakia Beier, 1935. *Gen. Ins.*, 47.

57. ***Amantis biroi*** Giglio-Tos, 1915 – India; Andaman Island, Andhra Pradesh, Maharashtra, Tamil Nadu, West Bengal. **Elsewhere:** Indonesia, Sunda Island.
Amantis biroi Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 153.
58. ***Amantis bolivari*** Giglio-Tos, 1915 – India; Arunachal Pradesh, Meghalaya, Rajasthan, Tamil Nadu, West Bengal. **Elsewhere:** Myanmar, Nepal.
Amantis bolivari Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 153.
59. ***Amantis fuliginosa*** (Werner, 1931) – India; Kerala, Tamil Nadu. **Elsewhere:** Myanmar, Nepal.
Cimantis fuliginosa Werner, 1931. *Proc. Zool. Soc. Lond.*, 1330.
60. ***Amantis fumosana*** (Giglio-Tos, 1915) – India; Arunachal Pradesh, Kerala, Sikkim, Uttar Pradesh, West Bengal.
Cimantis fumosana Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 155.
61. ***Amantis indica*** Giglio-Tos, 1915- India; Chhattisgarh, Kerala, Sikkim.
Amantis indica Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 152.
62. ***Amantis malabarensis*** Vyjayandi & Narendran, 2005 – India; Kerala.
Amantis malabarensis Vyjayandi & Narendran, 2005. *Zoo. Print. J.*, 20(1): 1807.
63. ***Amantis saussurei*** (Bolivar, 1897) - India- Andhra Pradesh, Chhattisgarh, Goa, Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh.
Iridopteryx saussurei Bolivar, 1897. *Ann. Soc. Ent. Fr.*, 66: 305.
64. ***Amantis subirina*** Giglio-Tos, 1915 - India; Assam, Maharashtra, West Bengal.
Amantis subirina Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 151.
65. ***Amantis testacea*** (Werner, 1931) – India; Kerala, West Bengal.
Cimantis testacea Werner, 1931. *Proc. Zool. Soc. Lond.*, 1330.

Tribe Iridopterygini
Subtribe Iridopterygina
Genus *Hapalopeza* Stål, 1877

Hapalopeza Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 23.

66. ***Hapalopeza nilgirica*** Wood-Mason, 1891 – India; Karnataka, Kerala, Maharashtra, Tamil Nadu.
Hapalopeza nilgirica Wood-Mason, 1891. *Cat. Mant.*, pl. 2, fig. 4, 4a, 4b (based on figures only).
67. ***Hapalopeza periyara*** Mukherjee & Hazra, 1985 – India; Kerala.
Hapalopeza periyara Mukherjee & Hazra, 1985. *Entomon*, 10(3): 257.

D. Superfamily HAANIOIDEA Giglio-Tos, 1915
VI. Family HAANIIDAE Giglio-Tos, 1915
Subfamily Caliridinae
Genus *Caliris* Giglio-Tos, 1915 (=***Beesonula*** Uvarov, 1939)

Caliris Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 82.
Beesoniella Werner, 1935. *Proc. Zool. Soc. Lond.*, 498.
Beesonula Uvarov, 1939. *Ann. Mag. Nat. Hist.*, 3(11): 458.

68. ***Caliris masoni*** (Westwood, 1889) – India; Arunachal Pradesh, Assam, Meghalaya. **Elsewhere:** Malaysia, Philippines, Vietnam.
Iris masoni Westwood, 1889. *Revis. Mantid.*, 32.
69. ***Caliris mukherjeei*** Kamila & Sureshan, 2022 – India; Kerala.
Caliris mukherjeei Kamila & Sureshan, 2022. *Entomon*, 47(1): 90-91.
70. ***Caliris pallida*** (Werner, 1935) [= *Caliris keralensis* (Vyjayandi, Narendran & Mukherjee, 2006)] – India; Kerala, Tamil Nadu.
Beesoniella pallida Werner, 1935. *Proc. Zool. Soc. Lond.*, 498.
Iris keralensis Vyjayandi, Narendran & Mukherjee, 2006. *Orient. Insects*, 40: 285.

Subfamily Haaniinae
Tribe Arriini
Genus *Arria* Stål, 1877 (=***Pseudothespis*** Mukherjee, 1995)

Arria Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 20.
Palaeothespis Tinkham, 1937. *Lingnan Sci. J.*, 16: 497.
Pseudothespis Mukherjee, 1995. *Orient. Insects*, 29: 251.

71. ***Arria cinctipes*** Stål, 1877 – India; Manipur.
Arria cinctipes Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 46.
72. ***Arria meghalayensis*** (Mukherjee, 1995) – India; Meghalaya.
Pseudothespis meghalayensis Mukherjee, 1995. *Orient. Insects*, 29: 252.

E. Superfamily HYMENOPOIDEA Giglio-Tos, 1915
VII. Family EMPUSIDAE Burmeister, 1838
Subfamily Blepharodinae
Genus *Blepharopsis* Rehn, 1902

Blepharopsis Rehn, 1902. *Can. Ent.*, 34: 316.
Blepharis Audinet-Serville, 1831. *Annls. Sci. Nat.*, 22: 47.

73. ***Blepharopsis mendica*** (Fabricius, 1775)
- Subspecies ***Blepharopsis mendica mendica*** (Fabricius, 1775) – India; Rajasthan, Uttar Pradesh. **Elsewhere:** Afghanistan, Algeria, Canary Island, Chad, Cyprus, Egypt, Ethiopia, Iran, Iraq, Israel, Jordan, Lebanon, Libya, Mauritania, Morocco, Niger, Oman, Pakistan, Spain, Somalia, Sudan, Syria, Tunisia, Turkey.

Mantis mendica Fabricius, 1775. *Syst. Ent.*. 2: 275.
Mantis marmorata Olivier, 1792. *Enc. Meth., Ins.*, 7: 641.

Subfamily Empusinae
Tribe Empusini
Subtribe Empusina
Genus *Empusa* Illiger, 1798

Empusa Illeger, 1798. *Verz. Kafer Preuss.*, 499.
Phantoma Risso, 1826. *Hist. Nat. Eur. Merid.*, 5: 212.
Ampusa Rambur, 1839. *Faune Ent. Andalous.*, 2: 17.

74. ***Empusa fasciata*** Brulle, 1832 – India; Bihar. **Elsewhere:** Albania, Algeria, Bulgaria, Croatia, Cyprus, Egypt, Greece, Iran, Israel, Jordan, Nepal, Palestine, Romania, Turkey.
Empusa fasciata Brulle, 1832. *Exp. Moree.*, 3(2): 83.
75. ***Empusa guttula*** (Thunberg, 1815) – India; Andhra Pradesh, Odisha, Rajasthan, Uttar Pradesh. **Elsewhere:** Algeria, Angola, Cameroon, Egypt, Gambia, Kenya, Libya, Madagascar, Mauritania, Morocco, Namibia, Senegal, Somalia, South Africa, Tanzania, Tunisia.
Gongylus guttula Thunberg, 1815. *Mem. Acad. Sci. St. Petersb.*, 5: 294.
Empusa dolosa Audinet-Serville, 1839. *Hist. Ins. Orth.*, 143.
76. ***Empusa pennata*** (Thunberg, 1815) (=*pauperata* Fabricius, 1781) – India; Eastern Coast. **Elsewhere:** Algeria, Anatolia, Canary Island, France, Italy, Jamaica, Libya, Mallorca, Morocco, Oman, Pakistan, Sardinia, Saudi Arabia, Sicily, Spain, Sri Lanka, Tunisia, Yemen.
Gongylus pennata Thunberg, 1815. *Mem. Acad. Sci. St. Petersb.*, 5: 294.
Empusa pectinata Drury, 1770. *Ill. Nat. Hist.*, 1: 50.
Mantis spuria Goeze, 1778. *Ent. Beitrag.*, 2: 37.
Mantis tricornis Goeze, 1778. *Ent. Beitrag.*, 2: 34.
Empusa clavata Goeze, 1778. *Ent. Beitrag.*, 2: 34.

Mantis pauperata Fabricius, 1781. *Spec. Ins.*. 1: 346.
Phantoma variabilis Risso, 1826. *Hist. Nat. Eur. Merid.,* 5: 212.
Empusa egena Charpentier, 1841. *Z. Ent.*, 3: 297.
Empusa brachyptera Fischer-Waldheim, 1846. *Orth. Ross.*, 97.
Empusa europaea Fieber, 1853. *Lotos.*, 3: 96.
Empusa occidentalis Fieber, 1853. *Lotos.*, 3: 133.
Empusa humbertiana Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 60.
Empusa servillii Saussure, 1872. *Mem. Soc. Phys. Hist. Nat. Geneve.*, 23: 88.
Gryllus unicornis Linne, 1763. *Amoen. Ac.,* 6: 396.

77. ***Empusa spinosa*** Krauss, 1902 – India; Chandigarh, Chhattisgarh, Uttar Pradesh. **Elsewhere:** Natal, Oman, Saudi Arabia, Socotra, Yemen.
Empusa spinosa Krauss, 1902. *Anz. Akad. Wiss. Wien.*, 39(7): 53.
Mantis fronticornis Stoll, 1813. *Represent. Spectres. Mantes.,* 63.
Mantis nympha Stoll, 1813. *Represent. Spectres. Mantes.*, 63.
Empusa purpuripennis Audinet-Serville, 1839. *Hist. Ins. Orth.*, 145.
Vates wahlbergi Stål, 1856. *Ofvers. K. Vetens. Akad. Forh. Stockh.*, 13: 167.

Genus *Gongylus* Thunberg, 1815

Gongylus Thunberg, 1815. *Mem. Acad. Sci. St. Petersb.*, 5: 220.
Empusa (*Gongylus*) Burmeister, 1838. *Handb. Entomol.,* 2: 545.

78. ***Gongylus gongylodes*** (Linne, 1758) – India; Andhra Pradesh, Gujarat, Kerala, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Indonesia, Myanmar, Nepal, Sri Lanka, Thailand.
Gryllus (Mantis) gongylodes Linne, 1758. *Syst. Nat.*, 10: 1: 426.
Mantis flabellicornis Fabricius, 1793. *Ent. Syst.,* 2: 16.

79. ***Gongylus trachelophyllus*** Burmeister, 1838 – India; Bihar, Odisha. **Elsewhere:** Bangladesh.
Empusa (Gongylus) trachelophylla Burmeister, 1838. *Handb. Entomol.,* 2: 545.

VIII. Family HYMENOPODIDAE Giglio-Tos, 1915

Subfamily Acromantinae

Tribe Acromantini

Genus *Acromantis* Saussure, 1870

Acromantis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.,* 3: 229.

80. ***Acromantis insularis*** Giglio-Tos, 1915 – India; Goa, Karnataka, Kerala, Tamil Nadu. **Elsewhere:** Indonesia, Nepal.
Acromantis insularis Giglio-Tos, 1915. *Boll. Musei Zool. Anat. Comp. R. Univ. Torino.*, 30(702): 6.

81. ***Acromantis montana*** Giglio-Tos, 1915 – India; Andaman Island, Arunachal Pradesh, Goa, Karnataka, Kerala, Maharashtra, Meghalaya, Tamil Nadu, Tripura. **Elsewhere:** Borneo; Indonesia.
Acromantis montana Giglio-Tos, 1915. *Boll. Musei Zool. Anat. Comp. R. Univ. Torino.*, 30(702): 7.

82. ***Acromantis nicobarica*** Mukherjee, 1995 – India; Nicobar Island.
Acromantis nicobarica Mukherjee, 1995. *Orient. Insects*, 29: 211.

83. ***Acromantis oligoneura*** (De Haan, 1842) – India; Assam, Maharashtra, Meghalaya, Tamil Nadu, West Bengal. **Elsewhere:** Indonesia, Sunda Island.
Mantis oligoneura De Haan, 1842. *Verh. Nat. Gesch. Nederl. Bezitt. Ins.*, 90.
Acromantis formosa Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3(5): 230.
Acromantis parvula Westwood, 1889. *Reis. Mantid.*, 43.

Genus *Ambivia* Stål, 1877

Ambivia Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 88.

84. ***Ambivia undata*** (Fabricius, 1793) – India; Andhra Pradesh, Arunachal Pradesh, Chhattisgarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Sikkim, Tamil Nadu, West Bengal. **Elsewhere:** Borneo, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.
Mantis undata Fabricius, 1793. *Ent. Syst.*, 2: 88.

Ambivia popa Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 88.

Genus *Metacromantis* Beier, 1930

Metacromantis Beier, 1930. *Ann. Mag. Nat. Hist.*, 10(6): 455.

85. ***Metacromantis nigrofemorata*** Ghate, Rao, Javed & Roy, 2006 – India; Andhra Pradesh.
Metacromantis nigrofemorata Ghate, Rao, Javed & Roy, 2006. *Genus*, 17(3): 327.

Subfamily Hymenopodinae
Tribe Anaxarchini
Genus *Anaxarcha* Stål, 1877

Anaxarcha Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 81.
Anaxandra Kirby, 1904. *Syn. Cat. Orth.*, 1: 223.
Parastatilia Werner, 1922. *Zool. Mededeel. Mus. Leiden.*, 7: 119.

86. ***Anaxarcha acuta*** Beier, 1963 – India; Meghalaya, Sikkim, West Bengal. **Elsewhere:** Bhutan.
Anaxarcha acuta Beier, 1963. *Stuttgart Beitr. Naturk.,* 106: 9.
87. ***Anaxarcha graminea*** **Stål**, 1877 – India; Nicobar Island, Kerala, Sikkim, West Bengal. **Elsewhere:** Malaysia, Myanmar, Thailand.
Anaxarcha graminea Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 87.
Anaxandra grammica Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 81.
88. ***Anaxarcha intermedia*** Mukherjee,1995 – India; Arunachal Pradesh, Karnataka, Kerala, Meghalaya.
Anaxarcha intermedia Mukherjee, 1995. *Orient. Insects*, 29: 214-215.
89. ***Anaxarcha punctillata*** (Werner, 1931) – India; Tamil Nadu.
Oxymantis punctillata Werner, 1931. *Proc. Zool. Soc. Lond.*, 4: 1333.

Genus *Heliomantis* Giglio-Tos, 1915

Heliomantis Giglio-Tos, 1915. *Boll. Musei Zool. Anat. Comp. R. Univ. Torino.*, 30(702): 2.
Paraspilota Bolivar, 1914. *As. Espan. Progr. Cienc. Nat.*, 5(4): 205.
Deiroharpax Werner, 1916. *Verh. Zool. Bot. Ges. Wein.,* 66(3-5): 283.

90. ***Heliomantis elegans*** (Navás, 1904) – India; Assam, Sikkim, West Bengal. **Elsewhere:** Bhutan, Nepal.
Polyspilota elegans Navás, 1904. *Boln. Soc. Aragon. Cienc. Nat.*, 3(5-6): 132.
Deiroharpax viridis Werner, 1916. *Verh. Zool. Bot. Ges. Wein.,* 66(3-5): 283.

Genus *Nemotha* Wood-Mason, 1884

Mantis (Nemotha) Wood-Mason, 1884. *Annls. Mag. Nat. Hist.*, 13(5): 35.

91. ***Nemotha metallica*** (Westwood, 1843) – India; Arunachal Pradesh, Assam. **Elsewhere:** Bangladesh.
Mantis metallica Westwood, 1843. *Arcana. Ent.*, 2: 51.

Genus *Odontomantis* Saussure, 1871

Odontomantis Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21(1): 32.
Antissa Stål, 1871. *Ofvers. K. Vetens. Akad. Forh. Stockh.,* 28(3): 400.

92. ***Odontomantis micans*** (Saussure, 1871) – India; Central India. **Elsewhere:** Borneo, Indonesia, Sunda Island, Sri Lanka, Thailand.
Gonypeta (Iridopteryx) micans Saussure 1871. *Mem. Soc. Hist. Nat. Geneve.,* 21: 194.
93. ***Odontomantis montana*** Giglio-Tos, 1915 – India; Odisha, Uttar Pradesh. **Elsewhere:** Indonesia, Malaysia.
Odontomantis montana Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 100.
94. ***Odontomantis ornata*** (Werner, 1935) (=*Euantissa ornata* Werner, 1935) – India; Uttar Pradesh. **Elsewhere:** Bangladesh.
Euantissa ornata Werner, 1935. *Proc. Zool. Soc. Lond.,* 498.
95. ***Odontomantis pulchra*** (Fabricius, 1787) [=*Euantissa pulchra* (Fabricius, 1787)] – India; Andhra Pradesh, Chhattisgarh, Karnataka, Kerala, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** China, Sri Lanka.
Mantis pulchra Fabricius, 1787. *Mant. Ins.*, 1: 229.
Mantis caffraria Lichtenstein, 1802. *Trans. Linn. Soc. Lond.*, 6: 31.
Mantis flavicincta Olivier, 1792. *Enc. Meth., Ins.,* 7: 641.

Mantis marginalis Stoll, 1813. *Represent. Spectres. Mantes.*, 37.

Tribe Hymenopodini
Subtribe Hymenopodina
Genus *Hymenopus* Serville, 1831

Hymenopus Audinet-Serville, 1831. *Annls. Sci. Nat.*, 22: 46.
Hymenopa Audinet-Serville, 1839. *Hist. Ins. Orth.*, 162.

96. ***Hymenopus coronatus*** (Olivier, 1792) – India; Assam. **Elsewhere:** Borneo, China, Flores, Indonesia, Laos, Malaysia, Myanmar, Thailand, Vietnam.
Mantis coronatus Olivier, 1792. *Enc. Meth.*, 7: 638.

Subtribe Pseudocreobotrina
Genus *Creobroter* Audinet- Serville, 1839

Harpax (Creobroter) Audinet- Serville, 1839. *Hist. Nat. Ins. Orth.*, 160. Type species: *Mantis gemmata* Stoll, 1813.
Creoboter Burmeister, 1840. *Z. Ent.*. 2: 35.
Creobotra Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 59.
Creobrotra Saussure, 1898. *Rev. Suisse. Zool.*, 5: 198.

97. ***Creobroter apicalis*** Saussure, 1869 (=*elongatus* Beier, 1929) – India; Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Sikkim, Uttar Pradesh, West Bengal. **Elsewhere:** Bangladesh, Bhutan, China, Java, Nepal, Thailand.
Creobotra apicalis Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 73.
Creobroter elongatus Beier, 1929. *Zool. Anz.*, 81: 251.
98. ***Creobroter gemmatus*** (Stoll, 1813) – India; Arunachal Pradesh, Himachal Pradesh, Maharashtra, Sikkim, Uttar Pradesh. **Elsewhere:** China, Indonesia, Myanmar, Nepal, Sunda Island, Thailand, Vietnam.
Mantis gemmata Stoll, 1813. *Represent. Spectres. Mantes.*, 71.
99. ***Creobroter laevicollis*** (Saussure, 1870) – India; Andhra Pradesh, Assam, Bihar, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Sikkim, West Bengal. **Elsewhere:** Indonesia.
Creobotra laevicollis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3: 242.
100. ***Creobroter pictipennis*** Wood-Mason, 1878 - India. **Elsewhere:** Indonesia, Pakistan, Sri Lanka.
Creobroter pictipennis Wood-Mason, 1878. *Proc. Zool. Soc. Lond.*, 38: 585.
101. ***Creobroter urbanus*** (Fabricius, 1775) – India; Arunachal Pradesh, Meghalaya, West Bengal. **Elsewhere:** Borneo, China, Indonesia, Myanmar, Nepal, Philippines, Thailand, Vietnam.
Mantis urbana Fabricius, 1775. *Syst. Ent.*, 2: 278.

Subfamily Oxypilinae
Tribe Hestiasulini
Genus *Astyliasula* Schwarz & Shcherbakov, 2017

Astyliasula Schwarz & Shcherbakov, 2017. *Zootaxa*, 4291(2): 243.

102. ***Astyliasula inermis*** (Wood-Mason, 1879) [=*Hestiasula inermis* (Wood-Mason, 1879)] – India; Assam, Sikkim, West Bengal.
Hestias inermis Wood-Mason, 1879. *Proc. Zool. Soc. Lond.*, 258.

Genus *Catestiasula* Giglio-Tos, 1915

Catestiasula Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 101.

103. ***Catestiasula nitida*** (Brunner de Wattenwyl, 1893) [=*Hestiasula nitida* (Brunner De Wattenwyl, 1893)] – India; North (Ehrmann, 2002. *Mantodea der Welt*, 171-172). **Elsewhere:** Borneo, Indonesia, Myanmar.
Pachymantis nitida Brunner de Wattenwyl, 1893. *Annali Mus. Civ. Stor. Nat. Genova.*, 13(33): 72.

Genus *Ephestiasula* Giglio-Tos, 1915

Ephestiasula Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 101.
Parahestiasula Lombardo, 1995. *Spixiana.*, 18: 12.

104. ***Ephestiasula maculata*** Chatterjee, Ghorai, Srinivasan & Mukherjee, 2019 – India; Karnataka.

Ephestiasula maculata Chatterjee, Ghorai, Srinivasan & Mukherjee, 2019. *Proc. Zool. Soc*, 73: 184.

105. ***Ephestiasula rogenhoferi*** (Saussure, 1872) [= *Ephestiasula amoena* (Bolivar, 1897),= *Ephestiasula intermedia* Werner, 1930, = *Ephestiasula pictipes* (Wood-Mason, 1879)] – India; Andhra Pradesh, Chhattisgarh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Nepal.
Pachymantis rogenhoferi Saussure, 1872. *Mem. Soc. Phys. Hist. Nat. Geneve.*, 23: 77.
Pachymantis amoena Bolivar, 1897. *Ann. Soc. Ent. Fr.*, 66(2): 314.
Ephestiasula intermedia Werner, 1930. *Proc. Zool. Soc. Lond.*, 690.
Hestias pictipes Wood-Mason, 1879. *Proc. Asiatic. Soc. Bengal*, 258.
106. ***Ephestiasula woodmasoni*** Mukherjee, Stiewe & Ghorai, 2010 – India; Gujarat, Kerala.
Ephestiasula woodmasoni Mukherjee, Stiewe & Ghorai, 2010. *Genus*, 21(2): 169.

Genus *Hestiasula* Saussure, 1871

Hestiasula Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21(2): 453.
Hestias Saussure, 1872. *Mem. Soc. Phys. Hist. Nat. Geneve.*, 23: 83.

107. ***Hestiasula brachyptera*** Villani, 2016 – India; South-East India.
Hestiasula brachyptera Villani, 2016. *Quad. Studi. Not. Stor. Nat. Romagna.*, 44(1123-6787): 93-103
108. ***Hestiasula brunneriana*** Saussure, 1871 – India; Andhra Pradesh, Bihar, Chhattisgarh, Kerala, Maharashtra, Meghalaya, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Nepal, Pakistan, Sri Lanka.
Hestiasula brunneriana Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21: 454.
109. ***Hestiasula castetsi*** (Bolivar, 1897) – India; Kerala, Tamil Nadu.
Pachymantis castetsi Bolivar, 1897. *Ann. Soc. Ent. Fr.*, 66: 313.
110. ***Hestiasula kastneri*** Beier, 1942 – India; Tamil Nadu.
Hestiasula kastneri Beier, 1942. *Annln. Naturhist. Mus. Wien.*, 52: 148.
111. ***Hestiasula masoni*** Giglio-Tos, 1915-India.
Hestiasula masoni Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 100.
112. ***Hestiasula nigrofemorata*** Werner, 1930 – India; Uttar Pradesh.
Hestiasula nigrofemorata Werner, 1930. *Proc. Zool. Soc. Lond.*, 690.
113. ***Hestiasula woodi*** Giglio-Tos, 1915 – India. **Elsewhere:** Borneo, Indonesia, Myanmar.
Hestiasula woodi Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 100.

Tribe: Oxypilini

Genus *Ceratomantis* Wood-Mason, 1876

Ceratomantis Wood-Mason, 1876. *Proc. Asiat. Soc. Bengal.*, 175.

114. ***Ceratomantis ghatei*** Roy & Svenson, 2007 – India; Karnataka, Kerala.
Ceratomantis ghatei Roy & Svenson, 2007. *Bull. Soc. Entomol. Fr.*, 112(4): 433.

Subfamily Phyllothelyinae

Tribe Parablepharini

Genus *Parablepharis* Saussure, 1870

Parablepharis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3(5): 223.

115. ***Parablepharis kuhlii*** De Haan, 1842 subspecies *Parablepharis kuhlii asiatica* Roy, 2008 – India; Arunachal Pradesh, Assam, Rajasthan, Uttar Pradesh. **Elsewhere:** Laos, Myanmar, Thailand, Vietnam.
Parablepharis kuhlii asiatica Roy, 2008. *Bull. Soc. Entomol. Fr.*, 113(1): 56.

Tribe Phyllothelyini

Genus *Phyllothelys* Wood-Mason, 1877

Phyllothelys Wood-Mason, 1877. *J. Asiatic. Soc. Bengal.*, 53: 206.
Kishinouyeum Ouchi, 1938. *J. Shanghai Sci. Inst.*, 3: 23.

116. ***Phyllothelys decipiens*** Giglio-Tos, 1915 – India; Chhattisgarh, Tamil Nadu. **Elsewhere:** Borneo, Indonesia, Malaysia, Philippines.
Phyllothelys decipiens Giglio-Tos, 1915. *Boll. Musei Zool. Anat. Comp. R. Univ. Torino.*, 30(702): 10.

117. ***Phyllothelys werneri*** Karny, 1915 – India; Chhattisgarh, Madhya Pradesh, Uttar Pradesh. **Elsewhere:** China, Taiwan.
Phyllothelys werneri Karny, 1915. *Supplta Ent.*, 4: 106.
118. ***Phyllothelys westwoodi*** (Wood-Mason, 1876) – India; Andhra Pradesh, Arunachal Pradesh, Assam, Kerala, Maharashtra, Uttar Pradesh. **Elsewhere:** Bhutan, Myanmar.
Phyllocrania westwoodi Wood-Mason, 1876. *Annls. Mag. Nat. Hist.*, 175.

F. Superfamily MANTOIDEA Latreille, 1802
IX. Family DEROPLATYIDAE Westwood, 1889
Subfamily Deroplatyinae
Tribe Deroplatyini
Subtribe Deroplatyina
Genus *Deroplatys* Westwood, 1839

Deroplatys Westwood, 1839. *Intr. Classif. Ins.*, 1: 430.
119. ***Deroplatys indica*** Roy, 2007 – India; Kerala.
Deroplatys indica Roy, 2007. *Rev. Suisse Zool.*, 114(3): 507.

Subtribe Pseudempusina
Genus *Pseudempusa* Brunner de Wattenwyl, 1893

Pseudempusa Brunner De Wattenwyl, 1893. *Annali Mus. Civ. Stor. Nat. Genova.*, 13(33): 75.
120. ***Pseudempusa pinnapavonis*** Brunner de Wattenwyl, 1893 – India; Nagaland. **Elsewhere:** Myanmar, Thailand.
Pseudempusa pinnapavonis Brunner de Wattenwyl, 1893. *Annali Mus. Civ. Stor. Nat. Genova.*, 13(33): 75.

Tribe Euchomenellini
Genus *Indomenella* Roy, 2008

Indomenella Roy, 2008. *Bull. Soc. Entomol. Fr.*, 113(3): 330.
121. ***Indomenella indica*** (Ghate & Mukherjee, 2004) – India; Karnataka, Kerala, Tamil Nadu.
Euchomenella indica Ghate & Mukherjee, 2004. *Genus*, 15(3): 329.

X. Family MANTIDAE Latreille, 1802
Subfamily Choeradodinae
Genus *Asiadodis* Roy, 2004

Asiadodis Roy, 2004. *Bull. Soc. Entomol. Fr.*, 109(2): 118.
122. ***Asiadodis squilla*** (Saussure, 1869) – India; Meghalaya. **Elsewhere:** Sri Lanka.
Choeradodis squilla Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3(2): 72.

Subfamily Hierodulinae
Tribe Hierodulini
Genus *Hierodula* Burmeister, 1838

Hierodula Burmeister, 1838. *Handb. Entomol.*, 2: 536.
Parhierodula Giglio-Tos, 1912. *Bull. Soc. Ent. Ital.*, 43: 108.
Rhomboderula Giglio-Tos, 1912. *Bull. Soc. Ent. Ital.*, 43: 130.
123. ***Hierodula beieri*** Mukherjee, 1995 – India; Arunachal Pradesh.
Hierodula (Hierodula) beieri Mukherjee, 1995. *Orient. Insects*, 29: 291.
124. ***Hierodula coarctata*** Saussure, 1869 – India; Andhra Pradesh, Bihar, Maharashtra, Tamil Nadu, Telangana, Uttar Pradesh, West Bengal. **Elsewhere:** Indonesia, Nepal, Pakistan.
Hierodula coarctata Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 67.
125. ***Hierodula doveri*** Chopard, 1924 – India; Chhattisgarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Telangana.
Hierodula doveri Chopard, 1924. *Rec. Ind. Mus.*, 26: 175.
126. ***Hierodula dyaka*** Westwood, 1889 – India; North. **Elsewhere:** Borneo, China, Indonesia, Thailand.
Hierodula dyaka Westwood, 1889. *Rev. Mantid.*, 34.
127. ***Hierodula grandis*** Saussure, 1870 – India; Assam. **Elsewhere:** Bangladesh, Myanmar.
Hierodula grandis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3: 233.
128. ***Hierodula keralensis*** Vyjayandi & Narendran, 2003 – India; Karnataka, Kerala.
Hierodula (Hierodula) keralensis Vyjayandi & Narendran, 2003. *Entomon*, 28(4): 315.
129. ***Hierodula membranacea*** Burmeister, 1838 – India; Kerala, Maharashtra, Odisha,

Tamil Nadu. **Elsewhere:** China, Indonesia, Nepal, Sri Lanka, Thailand.
Mantis (Hierodula) membranacea Burmeister, 1838. *Handb. Entomol.,* 2: 536.
Mantis brivia Stoll, 1813. *Represent. Spectres. Mantes.*, 77.
Stagmatoptera veneratoria Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3: 232.

130. ***Hierodula nicobarica*** Mukherjee, 1995 – India; Andhra Pradesh, Nicobar Island, Tamil Nadu.
Hierodula (Hierodula) nicobarica Mukherjee, 1995. *Orient. Insects*, 29: 294.
131. ***Hierodula patellifera*** (Audinet-Serville, 1839) – India; Andaman Island, Arunachal Pradesh, Bihar, Chhattisgarh, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Australia, China, Croatia, France, Hawaii, Indonesia, Italy, Japan, Korea, Malaysia, New Guinea, Philippines, Taiwan.
Mantis patellifera Audinet-Serville, 1839. *Hist. Ins. Orth.*, 185.
Mantis bipapilla Audinet-Serville, 1839. *Hist. Ins. Orth.*, 189.
Hierodula manillensis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3: 233.
Hierodula raptoria Stål, 1877. *Ofvers. K. Vetens. Akad. Forh. Stockh.*, 4(10): 38.
Hierodula dispar Kirby, 1900. *Monogr. Christmas Isl., Andrews.*, 146.
Hierodula manillana Giglio-Tos, 1912. *Bull. Soc. Ent. Ital.*, 43: 96.
Hierodula yunnanensis Wang, 1993. *Syn. Classif. Mant. China*, 137.
Hierodula xishaensis Wang, 1993. *Zoological Res.*, 14(3): 140.
Hierodula multispina Wang, 1993. *Syn. Classif. Mant. China,* 141.
Hierodula daqingshanensis Wang, 1993. *Syn. Classif. Mant. China*, 143.
Hierodula assamensis Mukherjee, 1995. *Orient. Insects*, 29: 185.
132. ***Hierodula tenuidentata*** Saussure, 1869 India; Andaman Island, Andhra Pradesh, Bihar, Karnataka, Kerala, Lakshadweep, Madhya Pradesh, Maharashtra, Nicobar Island, Odisha, Uttar Pradesh, West Bengal; **Elsewhere:** Albania, Armenia, Azerbaijan, Borneo, Bosnia and Herzegovina, Bulgaria, China, Croatia, France, Georgia, Greece, Indonesia, Iran, Italy, Kazakhstan, Nepal, Pakistan, Romania, Russia, Serbia, Slovania, Spain, Tajikistan, Turkey, Turkmenistan, Ukrain.
Hierodula tenuidentata tenuidentata Saussure, 1869. *Mitt. Schweiz. Ent. Ges.,* 3: 68.
Hierodula tenuidentata heterodera Westwood, 1889. *Revis. Mantid.*, 34.
133. ***Hierodula unimaculata*** (Olivier, 1792) – India; Andhra Pradesh, Karnataka, Kerala, Pondicherry, Tamil Nadu, West Bengal. **Elsewhere:** China, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam.
Mantis unimaculata Olivier, 1792. *Enc. Meth.,* 7: 640.
Mantis notata Stoll, 1813. *Represent. Spectres. Mantes.*, 42.
134. ***Hierodula venosa*** (Olivier, 1792) – India; Tamil Nadu. **Elsewhere:** Borneo, Indonesia, Labuan Island, Myanmar, Philippines.
Mantis venosa Olivier, 1792. *Enc. Meth.,* 7: 639.
Mantis conspurcata Lichtenstein, 1796. *Cat. Mus. Zool. Hamburg.,* 3: 79.
Mantis punctata Stoll, 1813. *Represent. Spectres. Mantes.*, 49.
Mantis vitrea Stoll, 1813. *Represent. Spectres. Mantes.*, 15.
Mantis (Hierodula) hybrida Burmeister, 1838. *Handb. Entomol.,* 2: 536.
Mantis bankae Giebel, 1861. *Z. Ges. Naturw. Halle.*, 18: 111.
Hierodula 9- dentata Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 68.
Hierodula daphne Stål, 1877. . *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4: 38.
Hierodula athene Rehn, 1909. *Bull. Amer. Mus. Nat. Hist.*, 26: 180.
135. ***Hierodula ventralis*** Giglio-Tos, 1912 – India; Chhattisgarh, Goa, Kerala, Madhya Pradesh, Maharashtra.
Hierodula ventralis Giglio-Tos, 1912. *Bull. Soc. Ent. Ital.*, 43: 82.

Genus *Rhombodera* Burmeister, 1838
Rhombodera Burmeister, 1838. *Handb. Entomol.,* 2: 536.

136. ***Rhombodera crassa*** Giglio-Tos, 1912 – India; Chhattisgarh, Madhya Pradesh, Meghalaya, Nagaland, West Bengal.
Hierodula (Rhombodera) crassa Giglio-Tos, 1912. *Bull. Soc. Ent. Ital.*, 43: 93.
137. ***Rhombodera fratricida*** Wood-Mason, 1878 – India; Kerala. **Elsewhere:** Borneo, Indonesia, Malaysia, Sunda Island.
Hierodula (Rhombodera) fratricida Wood-Mason, 1878. *Proc. Zool. Soc. Lond.*, 38: 581.

Genus *Rhombomantis* Ehrmann & Borer, 2015
Rhombomantis Ehrmann & Borer, 2015. *Ver. Nat. K. Mus. Erfurt.,* 5: 238.

138. ***Rhombomantis butleri*** (Wood-Mason, 1878) (=*Rhombodera butleri* Wood-Mason, 1878) – India; Assam, Maharashtra, Manipur, Meghalaya, Nagaland, Sikkim, West Bengal. **Elsewhere:** Nepal.
Hierodula (Rhombodera) butleri Wood-Mason, 1878. *Proc. Zool. Soc. Lond.,* 38: 580.
139. ***Rhombomantis longipennis*** Wang, Ehrmann & Borer, 2021 – India; West Bengal. **Elsewhere:** China, Myanmar, Thailand.
Rhombomantis longipennis Wang, Ehrmann & Borer, 2021. *Faunitaxys*, 9 (8), 1 – 23.
140. ***Rhombomantis tectiformis*** (Saussure, 1870) (=*Rhombodera tectiformis* Saussure, 1870) – India; Bihar, Chhattisgarh, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Sikkim, Tamil Nadu. **Elsewhere:** Myanmar, Nepal, Pakistan.
Hierodula (Rhombodera) tectiformis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3(5): 232.
141. ***Rhombomantis woodmasoni*** (Werner, 1931) (=*Rhombodera woodmasoni* Werner, 1931) – India; Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh. **Elsewhere:** Malaysia, Nepal.
Hierodula (Rhombodera) woodmasoni Werner, 1931. *Proc. Zool. Soc. Lond.*, 4: 1331.

Subfamily Mantinae

Genus *Mantis* Linne, 1758
Gryllus (Mantis) Linne, 1758. *Syst. Nat.*, 10: 1: 425.
Mantes Geoffroy, 1764. *Hist. Ins.,* 1: 399.

142. ***Mantis religiosa*** Linne, 1758
- Subspecies ***Mantis religiosa inornata*** Werner, 1930 – India; Arunachal Pradesh, Bihar, Madhya Pradesh, Maharashtra, Odisha, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Iran, Nepal, Pakistan.
Mantis inornata Werner, 1930. *Proc. Zool. Soc. Lond.*, 32: 689.
Mantis religiosa akbari Soomro, Soomro & Wagon, 2001. *Sindh Univ. Res. Jour.,* 33(1): 23.
- Subspecies ***Mantis religiosa religiosa*** (Linne, 1758) – India; Chhattisgarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Tamil Nadu. Uttar Pradesh, West Bengal. **Elsewhere:** Africa, Asia, Europe, North America.
Gryllus (Mantis) religious Linne, 1758. *Syst. Nat.*, 10: 1- 426.
Mantis maroccana Thunberg, 1815. *Mem. Acad. Sci. St. Petersb.*, 5: 287.
Mantis radiata Fischer-Waldheim, 1846. *Orth. Ross.*, 101.
Mantis sancta Fabricius, 1787. *Mant. Ins.*, 1: 228.

Genus *Statilia* Stål, 1877
Statilia Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.,* 4(10): 36.

143. ***Statilia apicalis*** (Saussure, 1871) – India; Andaman Island, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Sikkim, Uttar Pradesh, West Bengal. **Elsewhere:** Australia, China, Ghana, Indonesia, New Caledonia, New Guinea.
Mantis apicalis Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21: 291.
Statilia guineensis Chopard, 1954. *Mem. Inst. Fond. Afr. Noire.*, 40(2): 20.
144. ***Statilia maculata*** (Thunberg, 1784) – India; Andaman Island, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Sikkim, Telangana, Uttar Pradesh, West Bengal.

Elsewhere: Borneo, China, Indonesia, Japan, Labuan, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Russia, South Korea, Sri Lanka, Taiwan, Thailand, United States of America, Vietnam.

Mantis maculata Thunberg, 1784. *Nov. Ins. Spec.,* 3: 61.

Mantis orientalis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3: 233.

Pseudomantis haani Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21: 185.

Statilia maculata var. *hyalina* Giglio-Tos, 1927. *Tierreich.*, 50: 411.

145. ***Statilia nemoralis*** (Saussure, 1870) – India; Arunachal Pradesh, Himachal Pradesh, Kerala, Maharashtra, Manipur, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Borneo, China, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, Philippines, Taiwan, Thailand, Vietnam.

Pseudomantis nemoralis Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3(5): 229.

Statilia nemoralis var. *infuscata* Giglio-Tos, 1927. *Tierreich.*, 50: 411.

146. ***Statilia nobilis*** (Brunner de Wattenwyl, 1893) – India; Himachal Pradesh, Manipur, West Bengal. **Elsewhere:** Myanmar.

Mantis nobilis Brunner de Wattenwyl, 1893. *Annali Mus. Civ. Stor. Nat. Genova.*, 13(33): 70.

Mantis indica Mukherjee, 1995. *Orient. Insects*, 29: 300.

Subfamily Tenoderinae
Tribe Tenoderini
Subtribe Tenoderina

Genus *Mesopteryx* Saussure, 1870

Mesopteryx Saussure, 1870. *Mitt. Schweiz. Ent. Ges.,* 3(5): 235.

147. ***Mesopteryx alata*** Saussure, 1870 – India; North. **Elsewhere:** China, Philippines.

Mesopteryx alata Saussure, 1870. *Mitt. Schweiz. Ent. Ges.,* 3(5): 235.

148. ***Mesopteryx platycephala*** (Stål, 1877) – India; Assam, Sikkim, West Bengal. **Elsewhere:** Cambodia, Myanmar, Nepal.

Tenodera platycephala Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 56.

149. ***Mesopteryx robusta*** Wood-Mason, 1882 – India; Andaman Island, Assam, Sikkim.

Mesopteryx robusta Wood-Mason, 1882. *J. Asiat. Soc. Bengal*, 51(2): 36.

Genus *Tenodera* Burmeister, 1838

Mantis (Tenodera) Burmeister, 1838. *Handb. Entomol.,* 2: 534.

Paratenodera Rehn, 1903. *Proc. Acad. Nat. Sci. Philadelphia*, 55: 705.

150. ***Tenodera angustipennis*** Saussure, 1869 – India; Meghalaya, Sikkim, West Bengal. **Elsewhere:** China, Eastern United States of America, Hawaii, Indonesia, Japan, Korea, Siberia.

Tenodera angustipennis Saussure, 1869. *Mitt. Schweiz. Ent. Ges.*, 3: 69.

151. ***Tenodera aridifolia*** (Stoll, 1813)

- Subspecies ***Tenodera aridifolia aridifolia*** (Stoll, 1813) – India; Arunachal Pradesh, Assam, Himachal Pradesh, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** Borneo, China, Indonesia, Japan, Malaysia, Myanmar, Nepal, Taiwan, Thailand, United States of America.

Mantis aridifolia aridifolia Stoll, 1813. *Represent. Spectres. Mantes.*, 65.

Mantis japonica Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.,* 21: 238.

Mantis mandarinea Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.*, 21: 289.

152. ***Tenodera costalis*** (Blanchard, 1853) – India; Uttar Pradesh. **Elsewhere:** Indonesia, New Caledonia, Papua New Guinea.

Mantis costalis Blanchard, 1853. Voy. Pole. Sud., 4: 353.

Mantis fusca Blanchard, 1853. Voy. Pole. Sud., 4: 353.

153. ***Tenodera fasciata*** (Olivier, 1792)

- Subspecies ***Tenodera fasciata blanchardi*** Giglio-Tos, 1912 (Tenodera blanchardi Giglio-tos 1912) – India; Kerala. **Elsewhere:** Indonesia, Malaysia, Nepal, New Zealand, Philippines.

Tenodera blanchardi Giglio-Tos, 1912. *Bull. Soc. Ent. Ital.*, 43: 46.

- Subspecies ***Tenodera fasciata fasciata*** (Olivier, 1792) – India; Arunachal Pradesh, Assam, Maharashtra, Manipur, Meghalaya, Odisha, Uttar Pradesh, West Bengal. **Elsewhere:** Borneo, China, Indonesia,

Malaysia, Myanmar, Nepal, Sri Lanka, Thailand.
Mantis fasciata Olivier, 1792. *Enc. Meth., Ins.*, 7: 640.
Mantis leptelytra Lichtenstein, 1802. *Trans. Linn. Soc. Lond.*, 6: 20.
Mantis attenuata Stoll, 1813. *Represent. Spectres. Mantes.*, 13.
Mantis exsiccata Audinet-Serville, 1839. *Hist. Ins. Orth.*, 176.

154. ***Tenodera superstitiosa*** (Fabricius, 1781)

- Subspecies ***Tenodera superstitiosa superstitiosa*** (Fabricius, 1781) – India; Andaman Island, Bihar, Karnataka, Kerala, Maharashtra, Punjab, Uttar Pradesh. **Elsewhere:** Angola, Burkina Faso, Cameroon, Ghana, Indonesia, Ivory Coast, Namibia, Natal, Senegal, Singapore, Somalia, Togo, Zanzibar.
Mantis superstitiosa Fabricius, 1781. *Spec. Ins.*, 1: 348.

Genus *Tenospilota* Roy & Ehrmann, 2014

Tenospilota Roy & Ehrmann, 2014. *Bull. Soc. Ent. Fr.,* 119(3): 339.

155. ***Tenospilota nova*** (Beier, 1930) (=*Plistospilota nova* Beier, 1930) – India; Kerala, Assam. **Elsewhere:** Thailand.
Plistospilota nova Beier, 1930. *Ann. Mag. Nat. Hist.*, 10(6): 452.

G. Superfamily NANOMANTOIDEA Brunner De Wattenwyl, 1893

XI. Family AMORPHOSCELIDAE Stål, 1877

Subfamily Amorphoscelinae

Genus *Amorphoscelis* Stål, 1871

Amorphoscelis Stål, 1871. *Ofvers. K. Vetens. Akad. Forh. Stockh.*, 28(3): 401.

156. ***Amorphoscelis annulicornis*** Stål, 1871 – India; Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Daman & Diu, Himachal Pradesh, Kerala, Meghalaya, Odisha, Tamil Nadu, West Bengal. **Elsewhere:** Malaysia, Nepal, Sri Lanka.
Amorphoscelis annulicornis Stål, 1871. *Ofvers. K. Vetens. Akad. Forh. Stockh.*, 28(3): 401.
Amorphoscelis indica Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.,* 46: 33.
Amorphoscelis keiseri Beier, 1956. *Verh. Naturf. Ges. Basel.*, 67(1): 33.

157. ***Amorphoscelis brunneipennis*** Beier, 1956 – India; Andhra Pradesh, Kerala. **Elsewhere:** Sri Lanka.
Amorphoscelis brunneipennis Beier, 1956. *Verh. Naturf. Ges. Basel.*, 67(1): 34.

158. ***Amorphoscelis singaporana*** Giglio-Tos, 1915 – India; Assam, Chhattisgarh. **Elsewhere:** Borneo, Cambodia, China, Indonesia, Singapore, Thailand, Vietnam.
Amorphoscelis singaporana Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 32.

XII. Family LEPTOMANTELLIDAE Schwarz & Roy, 2019

Genus *Leptomantella* Burmeister, 1838

Leptomantella Uvarov, 1940. *Ann. Mag. Nat. Hist.*, 5(11): 176.
Leptomantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 87.

159. ***Leptomantella indica*** (Giglio-Tos, 1915) – India; Himachal Pradesh, Meghalaya, Tamil Nadu, West Bengal. **Elsewhere:** Nepal.
Leptomantis indica Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 88.

160. ***Leptomantella lactea*** (Saussure, 1870) – India; Meghalaya. **Elsewhere:** Borneo, Indonesia, Philippines, Sunda Island.
Miopteryx lactea Saussure, 1870. *Mitt. Schweiz. Ent. Ges.*, 3: 237.

161. ***Leptomantella montana*** (Beier, 1942) – India; Arunachal Pradesh, Assam, Meghalaya, West Bengal.
Leptomantis montana Beier, 1942. *Annln Naturh. Mus. Vienna.*, 52: 139.

162. ***Leptomantella nigrocoxata*** (Mukherjee, 1995) – India; Arunachal Pradesh.
Leptomantis nigrocoxata Mukherjee, 1995. *Orient. Insects*, 29: 248.

163. ***Leptomantella parva*** (Werner, 1933) – India; Chhattisgarh, Kerala, Tamil Nadu, Uttar Pradesh.
Leptomantis parva Werner, 1933. *Proc. Zool. Soc. Lond.*, 899.

XIII. Family NANOMANTIDAE Brunner De Wattenwyl, 1893

Subfamily Nanomantinae

Genus *Nanomantis* Saussure, 1871

Nanomantis Saussure, 1871. *Mem. Soc. Hist. Nat. Geneve.,* 21(1): 263
Profulcinia Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 62.
Gyrothespis Werner, 1928. *Mitt. Zool. Mus. Berl.*, 14(1): 36.

164. ***Nanomantis lactea*** Mukherjee, 1995 – India; Tamil Nadu.
Nanomantis lactea Mukherjee, 1995. *Orient. Insects*, 29: 259.

Genus *Ormomantis* Giglio-Tos, 1915

Ormomantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 51.

165. ***Ormomantis indica*** Giglio-Tos, 1915 - India. **Elsewhere:** Nepal.
Ormomantis indica Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 52.

Genus *Parananomantis* Mukherjee, 1995

Parananomantis Mukherjee, 1995. *Orient. Insects*, 29: 259.

166. ***Parananomantis brevis*** Mukherjee, 1995 – India; Assam, Chhattisgarh, Himachal Pradesh, Jammu, Jharkhand, Karnataka, Manipur, West Bengal.
Parananomantis brevis Mukherjee, 1995. *Orient. Insects,* 29: 260.

167. ***Parananomantis fascifemorata*** Sureshan, Kamila & Fasano, 2023 – India; Kerala.
Parananomantis fascifemorata Sureshan, Kamila & Fasano, 2023. *Orient. Insects*, 0(0): 1-12. (in press)

Subfamily Tropidomantinae
Tribe Tropidomantini

Genus *Eomantis* Giglio-Tos, 1915

Eomantis Giglio-Tos, 1915. *Bull. Soc. Ent. Ital.*, 46: 47.

168. ***Eomantis guttatipennis*** (Stål, 1877) – India; Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Tamil Nadu, Uttar Pradesh, West Bengal. **Elsewhere:** China, Tibet, Myanmar, Nepal, Vietnam.
Tropidomantis guttatipennis Stål, 1877. *Bih. K. Svenska. Vetensk. Akad. Handl.*, 4(10): 51.

169. ***Eomantis iridipennis*** (Westwood, 1889) – India; Chhattisgarh, Kerala. **Elsewhere:** Indonesia, Sri Lanka.
Miopteryx iridipennis Westwood, 1889. *Revis. Mantid.*, 38.

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Species composition of plants and trophically related aphids in the territory of the *Lasius niger* (Hymenoptera: Formicidae) nest complex

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Abstract

Ants can form large nest complexes with thousands of nests, such as *Lasius niger* for the suburbanized areas of Ukraine. *L. niger* inhabits meadows, abandoned fields, pastures, and young plantations of coniferous trees. The question of what constitutes the basis of the carbohydrate diet of *L. niger* ants in such large nest complexes remains unclear. In 2017-2018, 38 plant species were identified in the territory of the *L. niger* nest complex (Kyiv region, Ukraine). 4 species of plants (*Cirsium arvense*, *C. setosum*, *Onopordium acanthium*, *Oenothera rubricaulis*) were visited by *L. niger* foragers in 70–95% of cases. On these species of plants, colonies of aphids acted as sources of carbohydrate for ants. A total of 43 species of aphids were found, of which 32 were localized on the aerial parts of plants, the remaining species - on the roots and root neck of the plants. *L. niger* monopolize 98% of carbohydrate baits in the territory of the nest complex. A large number of myrmecophilous aphid species promotes effective trophobiosis of *L. niger* in the territory of the nest complex. This favors the stability of the supply of the carbohydrate resource to the ant colonies inhabiting the nest complex. The existence of the *L. niger* nest complex is possible in herbaceous plant communities when this ant species is capable of mutualistic relationships with a large number of myrmecophilous aphid species.

Keywords: *Lasius niger, nest complex, aphids, attractive plants, trophobiosis.*

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Introduction

Ants are able to form large settlements (nest complexes), which, under favourable conditions, include hundreds and thousands of nests. Such nest complexes can exist both in the form of independent colonies and in the form of a single supercolony. The latter is most often associated with invasive ant species. Nests in supercolonies are interconnected by a system of trails, workers from different nests do not show aggression towards each other or its level is minimal (Giraud *et al.*, 2002; Espadaler *et al.*, 2007; Stukalyuk and Netsvetov, 2018). The low aggressiveness between workers from different parts of the nest complex is especially pronounced in invasive ant species, some of which are unicolonial. These species include the Argentine ant (*Linepithema humile*), two large nest complexes of which have been recorded in Southern Europe (Giraud *et al.*, 2002). Somewhat smaller colonies are formed by the invasive garden ant *Lasius neglectus*, which is also widespread in Europe (Espadaler *et al.*, 2007).

In addition to invasive ant species, large settlements are also found in native species. A nest complex with hundreds of nests interconnected by trails through which the population and brood are exchanged is a common phenomenon for red wood ants *Formica rufa*, *F. polyctena*, *F. aquilonia* (Zakharov, 2015). In Japan, the ant species *Lasius sakagamii* is capable of forming supercolonies (Yamauchi *et al.*, 1981). For the full existence of such supercolonies, it is necessary to have favourable conditions, such as a sufficient number of nesting sites and the availability of food resources. In urban areas, nesting sites for ants are limited (Pecarevic e*t al.*, 2010; Slipinski *et al.*, 2012; Radchenko *et al.*, 2019; Stukalyuk *et al.*, 2020), here it is difficult to find a suitable place for settlement for ant species that build above-ground nests or live in dry wood.

Supercolonies, which include millions and tens of millions of workers, need a constant supply of food resources. Many species of ants capable of forming supercolonies or large polycalic colonies are trophobionts, i.e., the main part of their diet is honeydew secreted by aphids. These species include both invasive ants (*Lasius neglectus*, *Crematogaster subdentata*) (Stukalyuk and Netsvetov, 2018; Espadaler *et al.*, 2007) and native species of ants (*Lasius fuliginosus*, *Formica rufa*, *F. polyctena*) (Zakharov, 2015). *Crematogaster subdentata* an invasive ant, both in the primary and in the invasive range, are able not only to collect aphids, but also store dried aphids as a source of protein food (Stukalyuk and Netsvetov, 2018).

The aphid colonies are protected by ants from their natural enemies – wasps, ladybugs, etc. As a rule, woody plants are a perennial source of resources on which aphids live and feed (Zakharov, 2015; Stukalyuk *et al.*, 2020). Therefore, the territories of supercolonies, as a rule, include trees, together with the aphid colonies living on them, in the composition of the common forage area. The study of relationships between plants, aphids and ants in the territory of supercolonies or nest complexes seems to be extremely important, since it sheds light on the possibility of their existence in specific urban and suburban conditions.

On the territory of urban landscapes, ants have a high abundance, comparable with natural biocenoses, mainly in parks and forest areas. These data were obtained from Kyiv, Warsaw, Helsinki, Moscow, Sofia and other European cities (Antonova and Penev, 2006; Vepsäläinen *et al.*, 2008; Lapeva-Gjonova *et al.*, 2010; Slipinski *et al.*, 2012; Putyatina *et al.*, 2018; Radchenko *et al.*, 2019; Stukalyuk *et al.*, 2020). In most of these cities, one of the most numerous ant species is *Lasius niger*, which was found in almost all surveyed biotopes – squares, parks, lawns, tree alleys along busy streets and highways.

In open spaces (abandoned agricultural fields, pastures) *L. niger* is able to form huge settlements, or nest complexes. Such settlements are composed of individual colonies, or polycalic colonies, but are not true supercolonies. Two nest complexes (A and B) that we discovered earlier in the Kyiv region (Ukraine), located on areas of 11.8 ha and 13.3 ha, included more than 14 thousand and 15 thousand nests, respectively. In terms of the number of nests, these complexes are the largest of those described in Europe for native ant species. On the territory of both nest complexes, tree and shrub vegetation occupies small areas, less than 3% of the area of the nest complex. Therefore, a natural question is what constitutes the basis of the nutrition of ants living in the territory of the nest complex, where grass vegetation is the main one. In this article, we tried to establish the species composition of aphids, analyze the attendance by ants on different plant species growing on the territory of one of the nest complexes (complex B), and also establish a relationship between the presence of invasive plant species and their attractiveness to ants.

Materials and Methods

Research region

The site under the study was located between the city of Vyshneve and the Sofiivska Borshchahivka village, Kyiv-Svyatoshinsky district, Kyiv region (coordinates of the central part of the nest complex B 50°23'25.7"N 30°20'11.4"E) on an abandoned arable field, which is at the stage of restoration succession. According to our calculations based on successional changes in vegetation and archival data, the field was no longer cultivated since 7-10 years. It has a flat relief with small elevations and lowlands with very dry clay soil.

Habitat characteristics

Ruderal and semi-ruderal communities of thermophilic and drought-adapted plant species, often form dense thickets. The biotope often includes invasive plant species, which may be dominant or subdominant. This habitat is considered as the initial stage of succession under constant anthropogenic load. This type of habitat is common in settlements, along roads, construction sites, wastelands, pastures, along rivers.

Plant communities

To conduct research, we have chosen the following algorithm: a) study of the species composition of plants growing on the territory of the nest complex, taking into account their projective cover; b) study of the species composition of aphids on terrestrial (stems, leaves) and underground (roots) parts of plants; c) study of the density of *L. niger*

workers on plots and on carbohydrate baits; d) studying the number of *L. niger* workers visiting plants of different species and comparing the attractiveness of different plant species to ants, taking into account the presence of aphids.

All studies were carried out on the territory of one nest complex (complex B). During the research in June 2017, 14 geobotanical sites were observed in places with different density of anthills. Of these, 5 sites were observed in the central zone of the nest complex (the density of nest mounds is more than 16 per 100 m^2), 5 - on the periphery of the nest complex (the density of nest mounds is 6-10 per 100 m^2), 4 - on the outskirts of the territory of the nest complex, where the density of nest mounds is minimal (up to 5 nests per 100 m^2). Each geobotanical site covered an area of 100 m^2 and was completed using standard geobotanical techniques. Further processing and analysis of descriptions was carried out using the LibreOffice5.0 software package. The names of plant species are given according to Mosyakin and Fedoronchuk (1999). To determine plant species, the Dobrochaeva *et al.* (1999) was used.

Accounting for attractive plants

On the territory of nest complex B in June 2017, 2820 plants of 15 species were examined for attendance by ants. Cereals were not taken into account. Each plant was examined for 2 min and the number of ants on it was recorded. A total of 1139 ants of the same species, *L. niger*, were found. 3 dominant invasive plant species were observed: *Phalacroloma annuum* (L.) Dumort. (990 plants), *Lepidotheca suaveolens* (Pursh) Nutt. (210), *Ambrosia artemisiifolia* L. (150). 12 species of plants were classified as native. There were: *Cirsium setosum* (Willd.) Besser (30 plants), *Cirsium arvense* (L.) Scop. (150), *Euphorbia virgata* Waldst. et Kit. (300), *Raphanus raphanistrum* L. (270), *Potentilla argentea* L. (300), *Artemisia absinthium* L. (270), *Tripleurospermum inodorum* (L.) Sch. Bip. (60), *Verbascum thapsus* (90). Such records are necessary to compare the attractiveness of plants of different species for aphids and ants in the territory of the nest complex.

Aphids

The collection of aphids was carried out in 2017–2018 according to the methods adopted in aphidology. The collected aphids were fixed in 70% ethanol in laboratory test tubes. Aphids were selected from aboveground and underground parts of monocots and dicots herbaceous plants growing on the territory occupied by the *L. niger* nest complex. Aphid preparations were prepared according to the generally accepted method based on Faure-Berlise liquid. A total of 186 aphid samples were collected, 267 preparations were made. Aphid species were determined according to Blackman and Eastop, 2006.

Ants

The choice of sites with different density of nests was carried out in advance, in April 2017. At this time, the herbage is still low and anthills are clearly visible (Fig. 1).

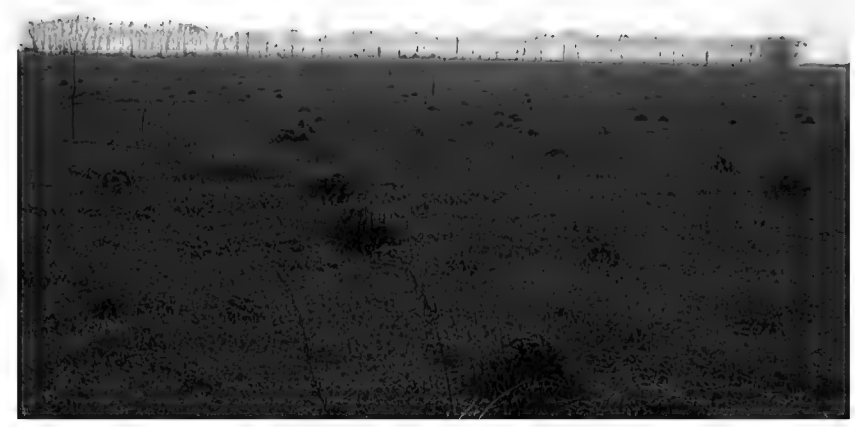

Figure 1. The *Lasius niger* nest complex B.

To assess density of ants in the forage area of nest complex B, 150 plots 50 × 50 cm were examined in June 2017. The inspection time for each plot was 2 minutes. The number of ants inside each plot was taken into account. Subsequently, 150 carbohydrate baits were laid out here. The distance between the baits was 2 m. After 30 minutes, the number of ants attracted to the baits was recorded. Considering that *L. niger* is a trophobiont species, the presence of a carbohydrate resource is important for it. Therefore, we have chosen exclusively carbohydrate baits. Also, the attendance of carbohydrate baits only by *L. niger* foragers will make it possible to establish to what extent they monopolize the resource on the territory of the nest complex. Plots and baits were placed in groups of 50 in zones with different density of nest mounds - in zone 3 (up to 5 nests per 100 m^2, the outskirts of the nest complex), in zone 2 (6–10 nest mounds per 100 m^2, the peripheral part of the nest complex), in zone 1 (more than 16

nest mounds per 100 m^2, the central part of the nest complex).

The search for nests of other ant species was also carried out on the territory of the nest complex B. For this, open areas (roads, paths), stones in open spaces, and fallen tree trunks (in an area with forest vegetation) were examined. In addition, 30 *L. niger* nests were excavated in June 2018 to identify nests of other ant species, as well as kleptobiont ants such as *Solenopsis fugax*.

Statistical analysis

For all statistical data processing, Past 4.03 was used. Differences between the means are displayed on graphs in boxplot mode: plot type – violin and box. This type of plot displays the spread of the data, the standard error of the mean, and the sample size. This type of plot is used to analyze large samples (more than 20 variables). Changes in the number of workers visiting the plots and baits in different zones of the nest complex were evaluated using the Mann-Whitney test. One-way ANOVA was used to compare the attractiveness of different plants to ants because this test is suitable for samples with more than two plant species.

Results and Discussion

General characteristics of plant communities: In general, the vegetation cover on the territory of nest complex is not dense, and its projective cover ranges from 40 to 65%. Herbage one-or two-layered. Its height is in the range of 20-30 cm and very rarely reaches 50-70 cm. Vegetation cover has a complex character. In addition to grass communities, there were small areas of tree and shrub vegetation, with a total area of up to 3 ha.

Vegetation cover: Among phytocenoses, the most common were *Elytrigia repens* (L.) Nevski (dominant) and *Phalacroloma annuum* (L.) Dumort (subdominant)(Table 1).

Much less common were communities dominated by *Dactylis glomerata* L. and *Calamagrostis epigeios* (L.) Roth. From our point of view, communities with *Dactylis glomerata* could have been over sown to use them as hayfields. Based on the results of the analysis of our materials, it can be argued that the vegetation of the study area has the most common combinations of phytocenoses: *Elytrigia repens purum*, *Elytrigia repens* + *Phalacroloma annuum*, *Dactilys glomerata* + *Achillea millefolium* + *Phalacroloma annuum*, *Calamagrostis epigeios* + *Elytrigia repens*, *Calamagrostis epigeios* + *Phalacroloma annuum*, *Phalacroloma annuum purum*. The number of plant species in the geobotanical plots varies from 5 to 17. The average is 9 species (Table 1). In total, we noted 38 species in the study area. The most common are *Phalacroloma annuum*, *Raphanus raphanistrum* L., *Elytrigia repens*. Plant species *Convolvulus arvensis* L., *Potentilla argentea* L., *Cirsium arvense* (L.) Scop., *Rorippa austriaca* (Crantz) Besser, *Melandrium album* (Mill.) Garcke, *Artemisia absinthium* L., *Potentilla neglecta* Baumg, *Carduus acanthoides* L. were slightly less common. Species *Dactylis glomerata*, *Calamagrostis epigeios*, *Oenothera rubricaulis* Klebahn, *Cirsium setosum*, *Tripleurospermum inodorum* are even rarer, but with a large projective cover. Other plant species are singly marked: *Asclepias syriaca*, *Acer negundo* L., *Achillea millefolium* L., *Agrostis capillaris* L., *Ambrosia artemisiifolia* L., *Arctium lappa* L., *Artemisia vulgaris* L., *Bromus hordeaceus* L., *Euphorbia cyparissias* L., *Euphorbia* sp., *Euphorbia virgata* Waldst. & Kit., *Galium verum* L., *Pilosella officinarum* F. Schultz & Sch. Bip., *Hypericum perforatum* L., *Lythrum salicaria* L., *Medicago lupulina* L, *Populus tremula* L., *Rumex acetosa* L., *Rumex acetosella* L., *Silene nutans* L., *Verbascum thapsus* L., *Vicia angustifolia* Reichard, *Vicia cracca* L., *Onopordum acanthium* L.

The most common plant species on the surface of nest mounds were *Elytrigia repens*, *Rorippa ausriaca*, *Convolvulus arvensis*, *Raphanus raphanistrum*, *Potentilla argentea*, *Melandrium album*, *Dactylis glomerata*, *Phalacroloma annuum*, *Achillea millefolium*, *Calamagrostis epigeios*.

Plant species *Elytrigia repens* (geobotanical plots 1-3, 5-7, 10, 13) dominates in the central areas of the nest complex, while the peripheral areas, as well as the borders of the nest complex, were occupied by the invasive species *Phalacroloma annuum* (geobotanical plots 4, 14).

Activity of ants: The density of *L. niger* workers on the plots is maximum in the central part of the nest complex. On the periphery of complex, density of ants, on an average, is already 4 times less than in the centre ($p \leq 0.05$), and on the borders of the nest

complex, it is 195 times less than in the central part ($p \leq 0.001$).

On an average, 1.7-8.3 times more ants come to baits than recorded on the same plots ($p \leq 0.05$). For *L. niger*, the Pearson correlation between the number of ants on the plots and on baits is slightly lower (0.66, $p \leq 0.0001$) than for *Myrmica rubra* (0.85, $p \leq 0.0001$). It may indicate greater food attractiveness of baits or faster mobilization to baits for *M. rubra* under competitive conditions with *L. niger*. The change in the quantitative indicators of the number of *L. niger* workers on baits from the centre to the periphery (3.2 times less, $p \leq 0.05$) and further to the borders (42 times less, $p \leq 0.05$) persists. Among other ant species, *M. rubra* is represented in one of the sites (near the trees). However, their number on sites, as well as on baits, is 4 and 2.6 times less than in *L. niger*, respectively. The maximum density of *L. niger* workers occurs in areas free from *Phalacroloma annuum* (-0.58, $p \leq 0.0001$). The reasons for this are discussed below. The intensity of the foraging activity of *L. niger* varies significantly between the examined zones (Fig. 2).

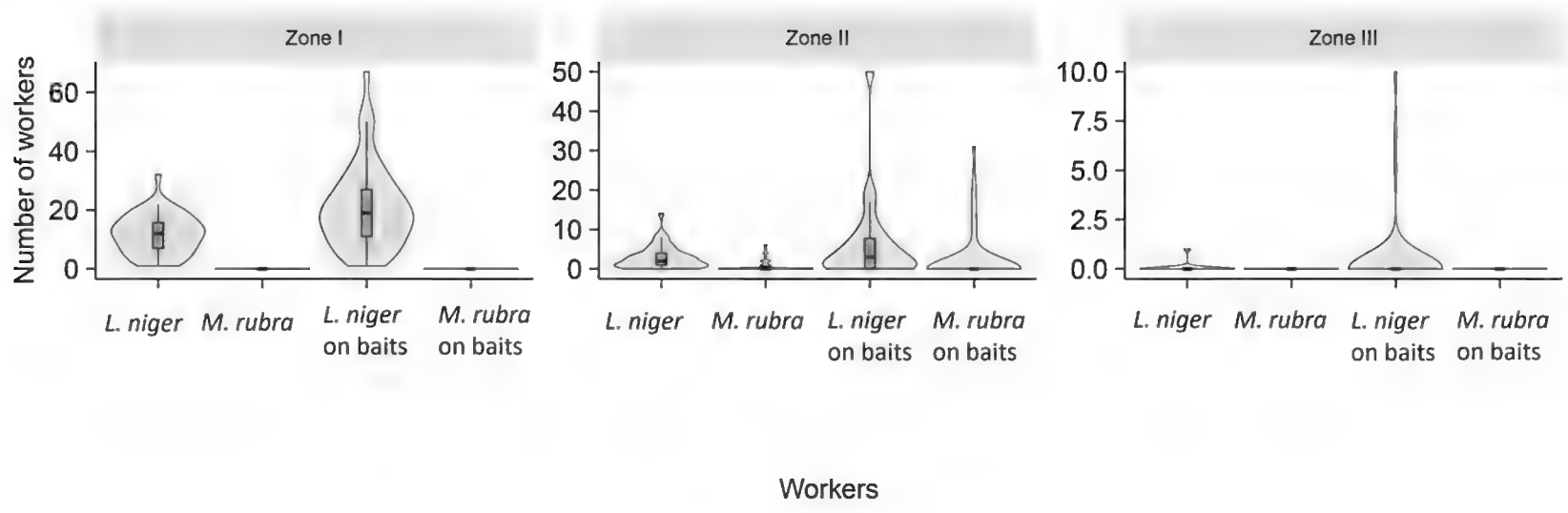

Figure 2. Average density on plots and baits of *Lasius niger* and *Myrmica rubra* foragers in different zones of nest complex B. Zone **I** – central part, **II** – periphery, **III** – borders of nest complex.

The highest density of worker ants per quadrat was recorded within central zone (I), followed by zones in periphery (II, Fig. 2, $p \leq 2.467E\text{-}10$) and in the borders of nest complex (III, $p \leq 3.363E\text{-}18$). The total number of ant workers maintaining the baits was significantly higher than the number of ant workers per quadrat (100 m^2) in all zones ($p \leq 0.006595$ for zone I, $p \leq 4.537E\text{-}05$ for zone II, and $p \leq 1.019E\text{-}08$ for zone III).

The *L. niger* ant workers occupied the majority of baits, while only 8 baits were occupied by the *M. rubra* workers. The number of *L. niger* workers visiting the baits was also significantly higher than that of *M. rubra* workers (Fig. 2, $p \leq 1.014E\text{-}13$).

The density of *L. niger* workers per plot varies significantly within nest complex B. In the central part, the average density of workers in the forage area is 46.8 per plot / 2 min, with a maximum of 128 workers and a minimum of 8 per plot / 2 min. In the peripheral part, these values are smaller and average 12 workers / 2 min, from 4 workers to 56 individuals / 2 min.

The species composition of ants in the territory of the *L. niger* nest complex

Colonies of the kleptobiont ant *Solenopsis fugax* were recorded in the nest mounds of *L. niger* in 10% cases (in 3 mounds out of 30 excavated). One *Camponotus vagus* colony and one *Dolichoderus quadripunctatus* colony were found on the territory of the forest vegetation site. Ants *Tetramorium caespitum* (mainly on dirt roads) were recorded on the territory of the grassy communities of the nest complex, and single colonies of *Formica rufibarbis* and *F. pratensis* were also recorded near the borders of the nest complex.

Species composition of aphids on host plants within the *L. niger* nest complex

The most significant aphid species *Aphis fabae* s. l. (in this article it is considered as a complex of closely related species and/or subspecies of aphids, including *Aphis fabae* ssp. *fabae* (=*Aphis fabae s. str.*), *Aphis fabae* ssp. *cirsiiacanthoidis* (=*Aphis cirsiiacanthoidis*), *Aphis fabae* ssp. *solanella* (= *Aphis solanella*), *Aphis fabae* ssp. *mordvilkoi* (=*Aphis mordvilkoi*)). Within the

Table 1. Vegetation on the territory of the nest complex B

Vegetation syntaxa / Dominant plant species	Number of geobotanical plot													
	1	**7**	**2**	**5**	**3**	**6**	**13**	**10**	**8**	**9**	**11**	**12**	**4**	**14**
D.s. Cl. *Artemisietea vulgaris*														
Artemisia absinthium	.	1	+	+	+	1	.	.	.	.	.	.	3	.
Achillea milefolium	.	.	.	.	.	.	.	.	1	3	.	.	.	.
Artemisia vulgaris	+	.	.	.	.	.	.	.	+	.	.	.	.	.
Carduus acanthoides	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Arctium lappa	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla argentea	+	.	1	1	.	1	2	.	+	.	.	.	.	+
Potentilla neglecta	+	.	.	.	1	.	.	1	.	1	.	.	1	.
D.s. Ord. *Agropyretalia repentis* = D.s. Al. *Convolvulo arvensis-Agropyrion repentis*														
D.s. Com. *Calamagrostis epigeios*														
Calamagrostis epigeios	.	.	.	.	+	.	.	.	.	.	4	4	.	.
D.s. Ass. *Agropyretum repentis*														
Cirsium arvensis	+	1	1	.	.	1	1	.	.	.	.	1	.	.
Convolvulus arvensis	+	.	.	.	+	1	1	1	1	1	+	.	.	.
D.s.Com. *Dactylis glomerata*														
Elytrigia repens	5	4	4	3	4	4	4	3	.	.	2	.	.	.
Dactylis glomerata	+	.	.	.	.	.	.	4	4	3	.	.	.	.
D.s. Com. *Phalacroloma annuum*														
Phalacroloma annuum	1	1	1	4	4	1	.	1	1	2	1	1	3	5
Other species														
Melandrium album	+	+	1	.	.	+	+	.	.	+	.	.	.	.
Raphanus raphanistrum	1	1	1	1	1	+	+	+	+	+	.	+	+	.
Rorippa ausriaca	1	1	+	.	.	+	+	+	.	.	.	1	.	.
Acer negundo	+	.	.	.	.	.	.	.	+	.	+	.	.	.
Agrostis capillaris	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Asclepias syriaca	+													
Bromus hordeaceus	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Rumex acetosa	.	.	.	.	1	.	.	.	.	.	.	.	+	.
Vicia cracca	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Euphorbia virgata	.	.	.	+	.	.	1	.	.	.	.	.	.	.
Ambrosia artemisiifolia	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Euphorbia cyparissias	.	+	+	.	.	.	.	.	1	.	.	.	.	.
Euphorbia sp.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Galium verum	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Pilosella officinarum	.	.	.	.	.	.	.	.	.	.	.	+	.	+
Hypericum perforatum	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Lythrum salicaria	+	.	.	.	.	.	.	.	.	.	+	.	.	+
Medicago lupulina	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Oenothera rubricaulis	+	.	+	.	.	.	.	.	+	.	.	+	.	.
Onopordium acanthium														+
Populus tremula	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Rumex acetosella	.	.	.	.	.	.	.	.	+	.	.	.	.	.

Silene nutans	.	.	.	.	.	.	.	.	+	+	.	.	.	.
Verbascum thapsus	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Vicia angustifolia	.	+	.	.	.	.	.	.	.	.	.	.	.	.

Note: D.s. Ord/Com/Ass/Al/Cl = Diagnostic species Order/ Community/ Association/ Alliance/ Class

Table 2. List of aphid species on plants in the territory of *Lasius niger* nest complex B

Plant species	Aphid species + Location on the plant
	Monocot plants
Elytrigia repens	On the roots *Anoecia corni, Anoecia vagans;* ***Forda formicaria, Geoica utricularia****; Tetraneura ulmi.* On the aboveground parts of plants, *Metopolophium dirhodum, Rhopalosiphum padi; Schizaphis graminum; Sipha elegans, Sipha maydis; Sitobion avenae.*
Dactylis glomerata	On the roots *Anoecia corni,* ***Baizongia pistaceae; Forda formicaria,*** *Tetraneura ulmi, Rhopalosiphum oxyacanthae* On the aboveground parts of plants *Atheroides serrulatus; Metopolophium dirhodum; Rhopalosiphum padi; Schizaphis graminum; Sipha maydis; Sitobion avenae*
Calamagrostis epigeios	On the roots *Anoecia corni, Tetraneura ulmi* On the aboveground parts of plants *Laingia psammae; Metopolophium dirhodum; Rhopalosiphum padi; Schizaphis graminum; Sipha maydis; Sitobion avenae*
Agrostis capillaris	On the roots *Anoecia corni,* ***Baizongia pistaciae; Forda formicaria;*** *Tetraneura ulmi* On the aboveground parts of plants *Rhopalosiphum padi; Schizaphis agrostis; Sipha glyceriae; Sitobion avenae*
Bromus hordeaceus	On the roots *Anoecia corni* On the aboveground parts of plants *Metopolophium dirhodum; Rhopalosiphum padi; Sitobion avenae*
	Dicot plants
Achillea millefolium	On the roots ***Trama troglodytes*** On the aboveground parts of plants *Aphis fabae* s. str., *Brachycaudus cardui, Metopeurum fuscoviride*
Arctium lappa	On the roots ***Smynthurodes betae*** On the aboveground parts of plants *Aphis fabae* ssp. *mordvilkoi* (=*Aphis mordvilkoi*), *Brachycaudus cardui, Brachycaudus helichrysi*
Artemisia vulgaris	On the roots ***Smynthurodes betae*** On the aboveground parts of plants *Aphis fabae* s. str., *Brachycaudus cardui, Brachycaudus helichrysi*
Carduus acanthoides	On the roots ***Trama troglodytes*** On the aboveground parts of plants *Aphis fabae ssp. solanella (= Aphis solanella), Brachycaudus cardui*;
Cirsium arvense	On the roots ***Trama troglodytes*** On the aboveground parts of plants *Aphis fabae* ssp. *cirsiiacanthoidis* (=*Aphis cirsiiacanthoidis*), *Brachycaudus cardui, Brachycaudus helichrysi.*
Cirsium setosum	On the aboveground parts of plants *Aphis fabae* ssp. *cirsiiacanthoidis* (=*Aphis cirsiiacanthoidis*), *Brachycaudus cardui*
Euphorbia cyparissias L.	On the aboveground parts of plants *Aphis euphorbiae*
Euphorbia virgata	On the aboveground parts of plants *Aphis euphorbiae*
Phalacroloma annuum	On the aboveground parts of plants *Aphis fabae* s. str.
Matricaria discoidea (=Lepidotheca suaveolens)	On the aboveground parts of plants *Aphis fabae* s. str.

Galium verum	On the aboveground parts of plants *Aphis galiiscabri*
Pilosella officinarum	On the aboveground parts of plants *Aphis gossypii, Brachycaudus helichrysi*
Hypericum perforatum	On the aboveground parts of plants *Aphis chloris*
Medicago lupulina	On the aboveground parts of plants *Acyrthosiphon pisum*; *Aphis craccivora, Aphis fabae, Megoura viciae*;
Oenothera rubricaulis	On the aboveground parts of plants *Aphis holoenotherae*
Onopordium acanthium	On the aboveground parts of plants *Aphis fabae* s. str., *Brachycaudus cardui Brachycaudus helichrysi*
Populus tremula	On the aboveground parts of plants *Chaitophorus populeti*
Rumex acetosa	On the roots *Dysaphis radicola*
	On the aboveground parts of plants *Aphis fabae ssp. solanella (= Aphis solanella)*
Rumex acetosella	On the roots *Dysaphis radicola*
	On the aboveground parts of plants *Aphis rumicis*
Silene nutans	On the aboveground parts of plants *Brachycaudus lychnidis*
Melandrium album	On the aboveground parts of plants *Brachycaudus populi*
	On the root neck, in shelters created by ants *Brachycaudus lychnicola.*
Verbascum thapsus	On the aboveground parts of plants *Aphis verbasci*
Vicia angustifolia	On the aboveground parts of plants *Aphis craccivora, Megoura viciae*
Vicia cracca	On the roots ***Smynthurodes betae***
	On the aboveground parts of plants *Acyrthosiphon pisum*, *Aphis craccae, Aulacorthum solani*; *Megoura viciae*

Note: For root aphids, non-full-cycle species are highlighted in bold (in the Kyiv region). The remaining species are reliably dioecious, but a paracycle on roots with incomplete development is possible.

territory of nest complex of *L. niger*, we found this species of aphids in large numbers on *Cirsium arvense*, *Cirsium setosum*, *Tripleurospermum inodorum*, *Onopordum acanthium*, *Arctium lappa*, *Carduus acanthoides*, *Asclepias syriaca*. On *L. suaveolens* and *Ph. annuum* colonies of *A. fabae* were found only on single plants. The second most important is *Brachycaudus cardui*, which massively populates Compositae (*Cirsium arvense*, *Cirsium setosum*, *Onopordum acanthium*, *Arctium lappa*, *Carduus acanthoides*). Since the above species of aphids are polyphages and oligophages, they populate many plant species within the nest complex. These species are not dominant numerically, and some of them were observed singly, but a wide range of food plants allows *Aphis fabae* s. l. and *Brachycaudus cardui* to spread throughout the nest complex.

Other species of aphids were observed on the aboveground parts of dicotyledonous plants, together with their food plants. This species of aphids were observed only locally (Table 2).

In general, within the entire nest complex, the contribution of these aphid species individually to providing ants with carbohydrate nutrition is probably not great, but they can play a significant role in certain areas within the nest complex, as well as in combination with other species.

As already noted, the tree and shrub vegetation within the nest complex occupies a small area, but there was a growth of *Populus tremula*, massively populated by the myrmecophilous aphid species *Chaitophorus populeti* (Panzer). Thus, in forest area, this aphid species plays a significant role in providing ants with carbohydrate nutrition.

It should be noted that the rhizobiont *Trama troglodytes* von Heyden was found on the roots of *Cirsium arvense*, *Carduus acanthoides*, and *Achillea millefolium*. This species forms large colonies on the roots of plants growing on or near nest mounds of *L. niger*. Until recently thought to be fully angolocyclic, but oviparous females and males have been found in Southern England (Blackman and Eastope, 2006), suggesting that a full cycle is possible, but probably very rare. Also, on the roots of *Artemisia vulgaris* and *Arctium lappa*, small colonies of *Smynthurodes betae* Westwood, a pistachio aphid, whose angolocyclic populations are

found on the roots of many secondary hosts outside the range of pistachios, were found.

We mention the findings of *Brachycaudus lychnicola* on the root collar of *Melandrium album* and *Silene nutans*, in shelters created by ants, but these aphids are quite rare.

It is important to note that within the nest complex of *L. niger* phytocenoses dominated by grasses, which are inhabited by their own aphid complex (Table 2), while many species feed on plant roots. The probability of finding aphids on the roots of plants growing on an nest mound and next to it is quite high, and in this case their contribution to the nutrition of ants can be very significant, especially since they are less affected by weather factors and pressure from parasites and predators than species that feed on above ground parts of plants. A number of them develop in the region completely with incomplete cycle, and some have a paracycle with incomplete development on the roots of cereals, i.e. larvae overwinter directly on the roots (including directly in the nest mound).

As a rule, colonies of aphids on one plant are few and far between, but given the large number of plants, their role in the feeding of ants can be significant. In our geobotanical descriptions, *Elytrigia repens*, *Dactylis glomerata*, *Calamagrostis epigeios* are dominant, and *Agrostis capillaris*, *Bromus hordeaceus* are noted singly, but the species composition of aphids on all these plants, with few exceptions, is similar. The aerial parts of grasses are dominated by aphids *Rhopalosiphum padi*, *Schizaphis graminum* and *Sipha maydis*. The first species is dioecious (they migrate to grasses from bird cherry), the rest are monoecious. *Anoecia corni*, *Anoecia vagans*, *Tetraneura ulmi*, and *Rhopalosiphum oxyacanthae* dominated among rhizobiont species on cereals. Unfortunately, in the case of root aphids, it is more difficult to estimate their prevalence. But by judging the abundance of these species on the primary fodder plants, they should be quite common on the roots of cereals. In addition, aphids of the tribe Fordini (*Forda formicaria*, *Geoica utricularia* and *Baizongia pistaceae*) were found on the roots of cereals up to St. Petersburg and Scandinavia. These species are often found on the roots of plants growing on nest mounds. Undoubtedly, root aphids play a significant role in the nutrition of ants.

Attendance by *L. niger* ants of plants

Ants were absent on the following plant species: *R. raphanistrum*, *L. suaveolens*, *P. argentea* (Fig. 3).

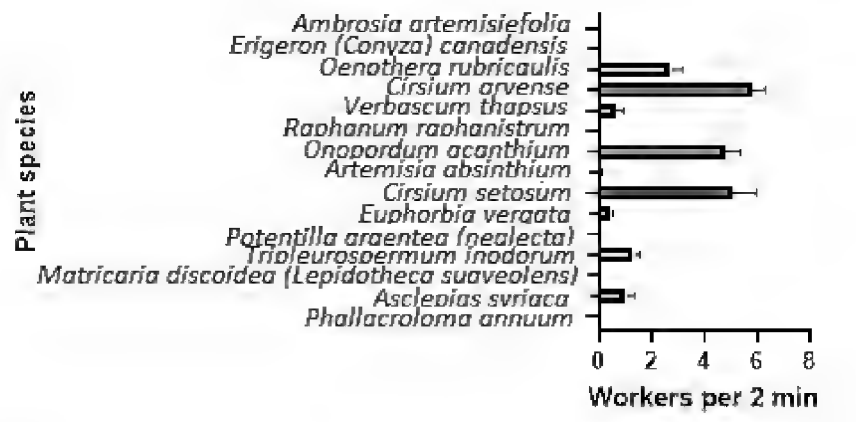

Figure 3. Average attendance by *Lasius niger* foragers of 15 species of plants in the territory of nest complex B (number of workers per 2 min per 1 plant ± standard error of the mean).

Single ants were found on *Phalacroloma annuum*, *E. virgata*, *A. absinthium* (from 0.006 to 0.09 individuals/1 plant/2 min). The ants most frequently visited 4 plant species (Fig. 3). They significantly differed from the other 11 plant species in terms of ant attendance ($p \leq 0.05 - 0.001$). The attractiveness of four species is explained by the high frequency of occurrence of aphid colonies: on *Onopordum acanthium* - in 95% of examined plants, on *Cirsium setosum* - in 76% of specimens, *Cirsium arvense* - 78%, on *Oenothera rubricaulis* - in 60% of plants.

Invasive dominant plants such as *P. annuum*, which are largely free of aphids, can have a negative impact on ant abundance by out-competing native species that are well colonized by aphids and frequented by ants. This is indirectly confirmed by the lower number of *L. niger* ants in the areas dominated by *P. annuum* (Fig. 2).

The influence of vegetation on the foraging of *L. niger* ants in the territory of the nest complex is primarily associated with aphids feeding on plants. According to Holec *et al.* (2006), ant foraging in summer is confined to areas with higher vegetation, for example, with the dominance of *Calamagrostis epigejos* in herbage. At the same time, the nest mounds of *L. niger*, on the contrary, are located in areas with vegetation that has a low projective grass cover. This is also confirmed by our data: the majority of nest mounds are concentrated in areas dominated by *Elytrigia repens*, i.e., in areas with herbaceous vegetation. This feature

emphasizes the similarity between *L. niger* and *L. sakagamii* - both species mainly settle in open spaces occupied by herbaceous vegetation (Yamauchi *et al.*, 1981). Other native ant species capable of forming supercolonies or large polycalic colonies, such as the red wood ants *Formica rufa*, *F. polyctena* and *F. aquilonia*, colonize forest areas and primarily visit aphid colonies located on trees (Zakharov, 2015). In this case, trees are a perennial resource that can be renewed annually. In the case of the nest complex studied by us, most herbaceous plant species belong to annuals, biennials, and much less often to perennials. Therefore, herbaceous plants visited by ants in the territory of the nest complex B can annually undergo more significant changes compared to trees as a result of fires or the expansion of areas occupied by invasive plant species unattractive to aphids and ants, such as *P. annuum*.

Lasius niger is the most abundant ant species in the study region, accounting for 5 to 45% of all ants found on woody plants in 6 types of habitats (Stukalyuk *et al.*, 2020) and from 37% to 76% of all ants visiting herbaceous plants in 6 habitat types (Stukalyuk *et al.*, 2019). *L. niger* visits 27 out of 37 herbaceous plant species (including 10 invasive species) and 22 out of 27 tree species. This wide range of visited plant species, greater than that of any other ant species, is responsible for the wide adaptive potential of *L. niger* and the potentially large number of visited aphid species that feed on these plants.

Foraging of *L. niger* ants on plants with aphid colonies can be carried out not only during the day, but also at night (Depickere *et al.*, 2004a). This increases the flow of food delivered to the nest mound. Foraging by mobilization increases with an increase in the amount of food (Depickere *et al.*, 2008), which we recorded on baits. Foraging on permanent food sources occurs within 5 min of detection and stabilizes within 40 min (Devigne and Detrain, 2002). These authors also recorded a high tolerance between ants from different nest mounds. The behaviour of *L. niger* foragers is characterized by greater mobility than in-breeding workers (Depickere *et al.*, 2004b). This causes greater interaction between foragers on the territory of the forage area, including the nest complex. Hungry individuals of *L. niger* are most often located in the nest chamber closest to the exit, which accelerates their mobilization to the discovered food source (Mailleux *et al.*, 2011). This makes it more efficient to locate the food source. As our studies have shown, *L. niger* monopolized almost all baits on the territory of the nest complex, preventing other ant species from using them. This feature contributes not only to the successful competition of *L. niger* with other native ant species, but even with invasive ones, for example, with the Argentine ant in experiments (Cordonnier *et al.*, 2020). The successful assimilation of the food resource by *L. niger* workers within the nesting complex is also facilitated by their high density, many times higher than that of other ant species in the same area, for example, *M. rubra*. Within the boundaries of the nest complex, it was *L. niger* that made up the absolute (98%) majority of the ants that visited the baits or were found on the plots. Nevertheless, the maximum density of *L. niger* workers in the territory of the nest complex is lower than it is known for other species, for example, for *L. sakagamii* (Yamauchi *et al.*, 1981), *L. flavus* (Waloff and Blackith, 1962).

In the studied territory of the nest complex, 6 invasive plant species were identified - *Ph. annuum*, *O. rubricaulis*, *O. acanthium*, *A. artemisiifolia*, *A. syriaca*, *L. suaveolens*. On plants *Ph. annuum*, *L. suaveolens*, *A. artemisiifolia* only single colonies of *Aphis fabae* were found or aphids were absent. Hence, the low attractiveness of these plants for ants in the study area and has a negative impact on their associations. First of all, this concerns *Phalacroloma annuum*, which is dominant in some areas of the nest complex and prevails where nest mounds are absent. Because among the invasive plant species *Ph. annuum* is a "transformer" species, i.e., capable of spreading over many territories and forming single-species communities of considerable size in place of native ones, the negative impact on ant associations of this plant increases significantly (Stukalyuk *et al.*, 2019). However, it should be noted that polyphagous myrmecophilous aphid species were recorded on these plants in many European countries, which makes them potentially attractive to ants. For example, for aphid species *Aphis fabae* (Czech Republic), *Brachycaudus helichrysi* (Balkan countries, Moldova, Czech Republic, Slovakia, Transcarpathian region of Ukraine),

Macrosiphum euphorbiae (Czech Republic, Serbia), *Myzus persicae* (Sulzer) (Serbia), *M. ornatus* (Laing) (Italy) (Holman, 2009).

Aphids are an important source of carbohydrate food for ants. Root aphids can be a major source of carbohydrate food for ants, as shown in *L. flavus* (Odum and Pontin, 1961). A significant number of species of root aphids found by us indicates their important role in the nutrition of the *L. niger* nest complex. *L. niger* workers are known to be able to distinguish between myrmecophilous and non-myrmecophilous aphid species based on the analysis of cuticular hydrocarbons (Lang and Menzel, 2011).

Ants, in particular, *L. niger*, contribute to an increase in the size of aphid colonies, as they protect them from natural enemies (including by building special earthen pavilions directly on plants in which aphids find shelter). Some of the growing nest mounds in complex were located around sagebrush bushes. *L. niger* is more effective in protecting aphids from natural enemies directly than *Tetramorium caespitum* (Katayama and Suzuki, 2003). For *Aphis fabae*, the number of aphids per colony visited by *L. niger* was 3 to 9 times higher than in colonies where ants were absent (El-Ziady and Kennedy, 1956). Exclusion of *L. niger* from visiting colonies of apple aphids (*Dysaphis plantaginea* Passerini, and the green apple aphid, *Aphis pomi* De Geer) by using sticky barriers on trunks or by feeding ants with honey has significantly increased the pressure of natural enemies on aphid numbers (Nagy *et al.*, 2013). If honey is offered to *L. niger* ants as a honeydew substitute, this affects the increase in ant predation in relation to aphids, while alternative prey (food of protein origin) did not affect predation in any way (Offenberg, 2001). For *L. niger* ants, the number of aphids per worker is important, since an excessive number of aphids will increase the number of cases of predation by ants. At the same time, ants prey on aphids to a lesser extent, which give honeydew to workers from their own nest (Sakata, 1994). Based on the above works, *L. niger* has all the features of a trophobiont species for which aphids are the main food resource. On the other hand, the presence of *L. niger* is also very important for aphids, since ants contribute not only to conservation, but also to a significant increase in their numbers.

The life cycles of aphids on plants also have a significant impact on the attractiveness of a plant to ants. Plants visited by ants from spring to autumn are the most attractive, because they always have aphid colonies. As for the life cycles of aphids, there are dioecious and monoecious species (full cycle and non-full cycle). In the first case, aphids develop in the spring on the primary food plants, and then migrate to the secondary ones. Migration occurs from May to the end of June. Some species of aphids migrate more quickly, while others migrate over time. Monoecious species develop without migration from spring to autumn.

During the growing season, the number of aphids and the number of plants infected by them change, which leads to unequal attractiveness of plants for ants in different phenological phases and stages of the plant life cycle. Infestation by aphids is carried out: a) at the beginning of the growing season in April–May, by founding females emerging from eggs with a complete monoecious (for example, *Schizaphis graminum*) or overwintered larvae with an incomplete development cycle (in monoecious root species, possible in *Aphis holoenotherae* on *Oenothera rubricaulis* plants, according to at least in some populations); b) during the period of migration of dioecious species (*Aphis fabae*, *Brachycaudus cardui*, *Rhopalosiphum padi*) from primary to secondary host plants in May–June; c) when aphids disperse throughout the season.

The physiological state of the plant is also of great importance for aphids. Plants that are in good condition are better able to provide the aphids with the nutrients they need to feed, which contributes to the development of the colony. For species such as *A. fabae* in the second generation, re-colonization is possible when aphids move to secondary shoots of the plant. Another aphid species (*Metopeurum fuscoviride*), which was protected by *L. niger* ants, migrated relatively little through the plant, putting them at risk of death if they produce less honeydew (Stadler *et al.*, 2002). Thus, the characteristics of the biology of different aphid species (life cycles, behaviour) can also be of great importance for their adaptive potential. We found aphids and *L. niger* ants on almost all examined specimens of *Cirsium arvense* plants. This indicates the

value of this plant and the other 3 most visited species for ants on the territory of the nest complex, since they are the main sources of carbohydrate food extracted from the aerial parts of plants - aphid colonies.

Conclusion

On the territory of the *Lasius niger* nest complex, 38 plant species were found, of which 4 are the most attractive for ants: *Cirsium arvense*, *C. setosum*, *Onopordum acanthium*, *Oenothera rubricaulis*. In total, 43 species of aphids were found on all plants. Of these, 32 species of aphids were found on the aboveground parts of plants, the rest were localized on the roots and root neck. A large number of myrmecophilous aphid species promotes effective trophobiosis of *L. niger* with them on the territory of the nest complex, which can increase the supply of the resource (carbohydrate excretions of aphids). Thus, the existence of colonies of *L. niger* ants as a nest complex is also possible in herbaceous plant communities, if the ant species is capable of mutualistic relationships with a large number of myrmecophilous aphid species.

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First record of *Oplatocera (Epioplatocera) oberthuri* (Gahan, 1906) (Coleoptera: Cerambycidae) from Meghalaya, North-eastern India

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Abstract

Based on the collection of six specimens from East Khasi Hills District, Meghalaya, we were able to confirm the presence of the long-horned beetle *Oplatocera (Epioplatocera) oberthuri* (Gahan, 1906) in Meghalaya, Shillong. Although, *O. oberthuri* is reported from other parts of India, including the neighbouring North-eastern states, it has not been documented from Meghalaya. In this present communication, we include photographs, brief comments, morphological characters and colour descriptions of the species for better biodiversity assessment.

Keywords: *Oplatocera (Epioplatocera) oberthuri, Cerambycidae, East Khasi Hills, long-horned beetle, Meghalaya.*

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Introduction

Cerambycidae, commonly known as longicorns, longhorns, longicorn beetles, long-horned beetles, long-horned borers, round-headed borers, timber beetles, or sawyer beetles, are among the most diverse and economically important families of Coleoptera (Monné *et al.*, 2017). The genus *Oplatocera* was described by White (1853), and two species *viz.*, *Oplatocera callidioides* (White) and *Oplatocera oberthuri* (Gahan) have been reported by Gahan (1906). Except for Sikkim, West Bengal and Nagaland (Kariyanna *et al.*, 2017; Mozhui *et al.*, 2020), the long-horned, *Oplatocera (Epioplatocera) oberthuri* (Gahan, 1906) has not been recorded from other parts of India. Since this paper confirms the presence of this particular species from East Khasi Hills District, there is every possibility of the distribution of the species extending to the other remaining districts of the state as well. The occurrence of this species has already been documented from other regions which share its borders with North East India, viz., Nepal, Bhutan and China (Kariyanna *et al.*, 2017). Photographs of the collected long-horned beetle specimen have been provided with a note on the characteristic features of the species.

Materials and Methods

The specimens were collected from East Khasi Hills district during the period of May to August, 2021 (Fig.1). Identification of the specimen was made based on the morphological characters as described by Gahan (1906). The beetles were observed alive and later the specimens were collected for morphological study. The map was prepared using ArcGIS. The specimens were dried and examined under Labomed CZM4 stereo zoom microscope, photographed with Canon G3X and scale was added with Adobe Photoshop v7.0. The specimens bearing the registration numbers, I/COL/NERC/283, I/COL/NERC /284, I/COL/NERC/285, I/COL/ NERC/286, I/COL/NERC/287 and I/COL/ NERC/288 respectively are preserved and deposited at Zoological Survey of India, North Eastern Regional Centre, Shillong.

Results and Discussion

Materials examined: 6 specimens collected from different locations falling within the domain of the district were examined. The morphometric measurements are provided (Table 1).

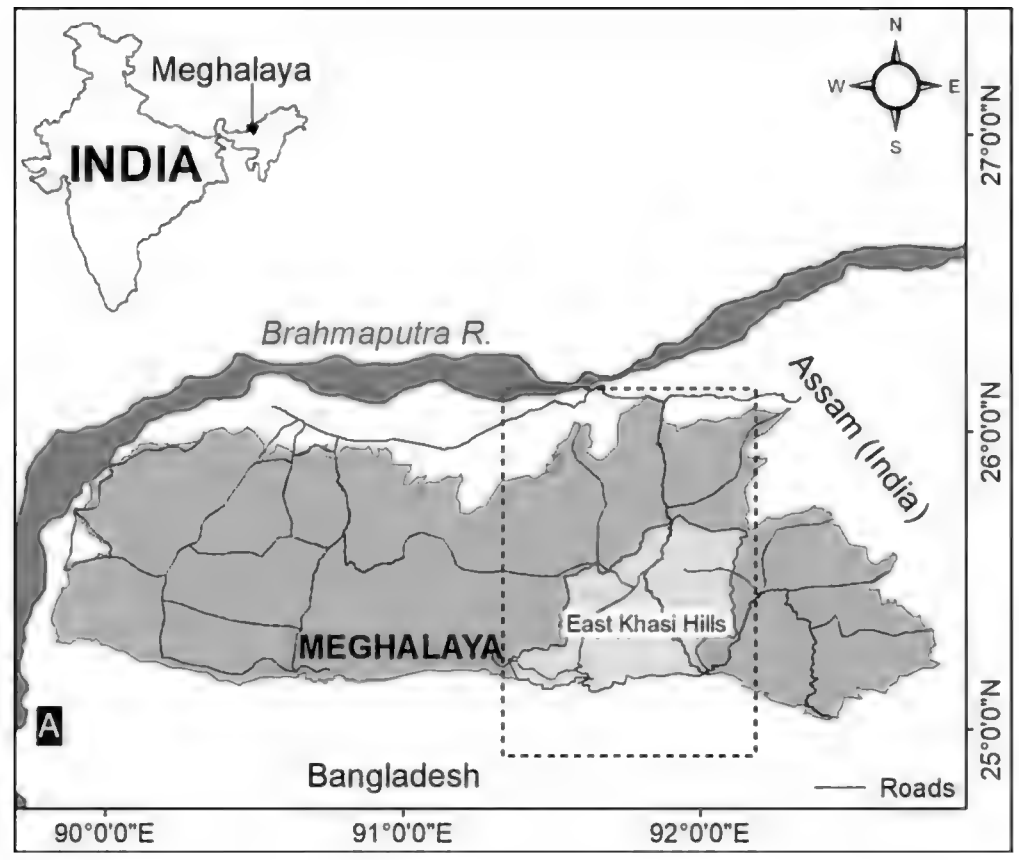

Figure 1: Location of East Khasi Hills, Meghalaya (Source: Survey of India toposheets)

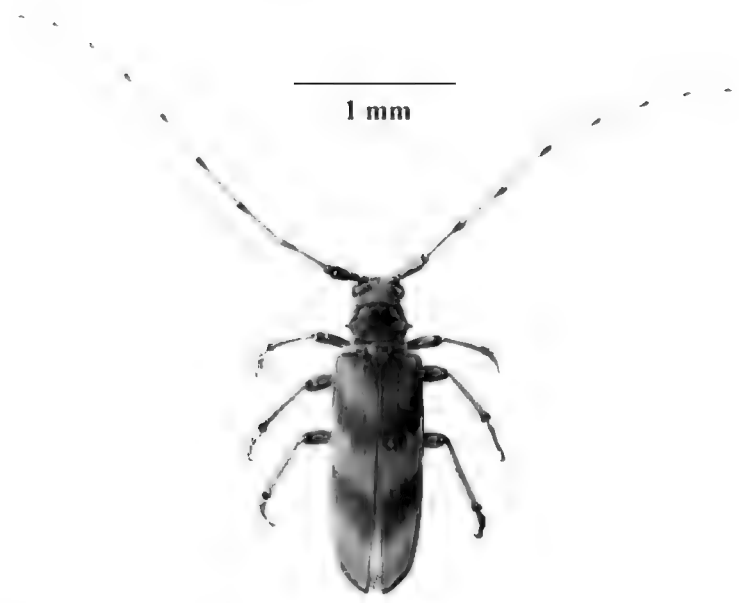

Figure 2: *Oplatocera oberthuri* (Gahan), dorsal view

Table 1. Morphometric measurements of *Oplatocera oberthuri*

Specimen	Body length (cm)	Antennae length (cm)	Locality	GPS Coordinates
1	2.6	3.2	Risa colony forest area	Lat: 25°33'40.52" N Long: 91°53'35.23" E
2	2.2	3.8	Risa colony forest area	Lat: 25°33'40.52" N Long: 91°53'35.23" E
3	2.5	2.8	Risa colony forest area	Lat: 25°33'40.52" N Long: 91°53'35.23" E
4	2.6	2.7	Madanrting	Lat: 25°33′23.49" N Long: 91°54′52.38" E
5	2.6	3.6	Nongrah	Lat: 25°34′49.33" N Long: 91°56′29.58" E
6	1.9	3.4	Mawblei	Lat: 25°33′13.28" N Long: 91°54′24.41" E

Description: The body is cinnamon brown in colour; antennae tipped with deep brown at the top of each joint; prothorax with 2 blackish brown marks on the disc with a narrow dark band on either section; elytra is well characterized, each with 2 slanting blackish brown bands appearing in a series of elongated marks positioned in a side-by-side manner. Head rugulose-punctate (Fig.2).

Gahan reported only two *Oplatocera* species which were *O. callidioides* White, 1853 (from northern India) and *O. oberthuri* Gahan, 1906 (from Darjeeling). There are also reports of *O. halli* Lepesme, 1956 (from Nilgiri Hills and Western Ghats) and *O. khasimontana* Hayashi, 1984 (from Khasi Hills, north-eastern India) (Ghate and Naidu, 2013). Therefore, as per literatures, there are presently four *Oplatocera* species from India. The occurrence of *O. oberthuri* has been observed to extend to Nagaland and now also in Meghalaya. It is evident from literatures and our new record of *O. oberthuri* that, studies on *Oplatocera* species as well as other species belonging to Cerambycidae in India are still poorly known and therefore, needs more interest for better biodiversity assessment.

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An updated list of bee species (Hymenoptera: Apoidea) found in West Bengal, India along with two new state records

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Abstract

The present study provides an updated list of bee species found in West Bengal, India. The list includes 137 species, belonging to 32 genera under 5 families. The paper also reports new state records of 2 bee species namely *Ceratina (Ceratinidia) compacta* (Smith) and *Megachile (Callomegachile) umbripennis* (Smith), along with data on their floral associations. The present study could observe an invasive plant species serving as an alternative food resource for bees when the native species is absent.

Keywords: *Bees, Pollinators, Apoidea, Hymenoptera.*

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Introduction

Bees are important ecosystem service providers and are considered to be the most effective of all insects in their role as pollinators (Raj *et al.*, 2012; Matias *et al.*, 2017). They are the primary pollinators of several plant species, both crop and non-crop. Pollination services provided by pollinators such as bees, birds and bats account for approximately 35% of the global agricultural produce (Klein *et al.*, 2007). The global bee population is on the decline triggered by anthropogenic effects like deforestation, habitat fragmentation and degradation, land conversion, global warming, climate change and extensive pesticide use in agriculture, which together have led to a scarcity of quality habitat holding ample food resource for bees (Potts *et al.*, 2010). Declining bee population and diversity has led to a sharp dip in pollination services, further contributing to pollen-limited fecundity among plants in natural communities with up to 62% of plants experiencing pollen deficit (Ashman *et al.*, 2004). So, it becomes important at this current scenario to gather ample information on the occurrence and distribution of bee species in regions across the globe so that future conservation efforts could be properly oriented towards reducing the recent biodiversity loss.

The global database reports the presence of 20,507 bee species in the world (Ascher and Pickering, 2022) distributed across 7 families namely Andrenidae, Apidae, Colletidae, Halictidae, Megachilidae, Melittidae and Stenotritidae (Michener, 2007). In India, about 796 bee species have been described so far in 71 genera under 6 families; 50 species in 1 genus from family Andrenidae, 225 species in 25 genera from family Apidae, 31 species in 2 genera from family Colletidae, 216 species in 14 genera from family Halictidae, 270 species in 27 genera from family Megachilidae and 4 species in 2 genera from Melittidae (Pannure and Belavadi, 2019; Ascher and Pickering, 2022).

Among all Indian states, although West Bengal is well known as an agrarian State, having cropping intensity of 184% and cultivating numerous pollinator dependent crop (West Bengal State Portal, 2022). However, a checklist of bees reported from the state is lacking. Even information and literature regarding these pollinators are very less and remain scattered. To fill up this knowledge lacuna, the present study attempts to provide an updated list of bee species found in the Indian state of West Bengal. In consort with the list, it also reports new distribution records of two bee species *Ceratina*

(Ceratinidia) compacta (Smith, 1879) (Family- Apidae) and *Megachile (Callomegachile) umbripennis* (Smith, 1853) (Family- Megachilidae) from West Bengal, India.

Materials and Methods

Study Site:

Intensive collections for bee specimens were made from Batanagar, a township in Maheshtala, Kolkata, South 24 Parganas and Acharya Jagadish Chandra Bose Indian Botanic Garden, Shibpur, Howrah of West Bengal, India during the month of September to December, 2021. These two sites may be characterized as urban green spaces. Coordinates of the study plot were taken using GPS (Model: Garmin GPSmap-76CSx).

Figure 1: Habitat shot of AJC Bose, Indian Botanic Garden, Howrah

Figure 2: Habitat shot of Batanagar, West Bengal

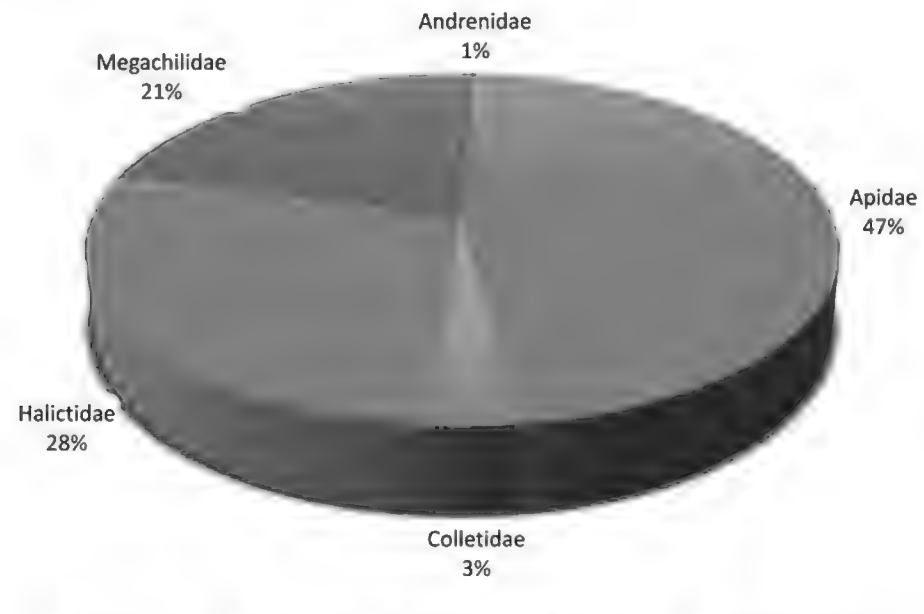

Figure 3: Percentage representation of different families of bees in West Bengal, India

The weather conditions varied from clouds and haze with intermittent rains during the months of September and October to fairly good weather with morning fogs during the months of November and December. Temperature and relative humidity varied between to 23°C to 32°C and 46% to 86%, respectively, during the study days.

The species list was prepared by literature survey and also based on recent bee collections made by the authors.

The specimens were collected using sweep net sampling. The collected bees were first killed in a killing jar containing cotton wool dabbed in ethyl acetate. The dead specimens were rinsed thoroughly with distilled water and then transferred to vials with absolute alcohol for preservation. In the laboratory, specimens were relaxed, stretched and pinned for identification.

Collected specimens were studied in detail under a stereomicroscope (Leica EZ4HD). Photomicrographs were obtained using a LEICA DFC 500 digital camera attached to LEICA M205 stereomicroscope (1X objective) and processed with LAS

version 3.6 extended focus software. The image plate was further processed by the Adobe Photoshop CC. The bee specimens were identified to species level. The classification followed Michener (2007). Voucher specimens are deposited at the National Zoological Collection (NZC), Zoological Survey of India, Kolkata.

Results

The current report gives an account of the bee species found in the state of West Bengal, India. A total of 137 species under 32 genera belonging to 5 families are recorded. The maximum number of bees were reported from Apidae (47%), followed by Halictidae (28%), Megachilidae (21%), Colletidae (3%), Andrenidae (1%) (Table 1).

Table 1: An updated checklist of Bees (Hymenoptera: Apoidea) from the state of West Bengal

Sl. No.	Species name	Reference
	Family – Andrenidae Subfamily- Andreninae Tribe- Andrenini	
1	*Andrena gracillima* (Cameron, 1897)	Ascher and Pickering, 2022
	Family – Apidae Subfamily- Apinae Tribe- Anthophorini	
2	*Amegilla (Amegilla) confusa* (Smith, 1854)	Ascher and Pickering, 2022
3	*Amegilla (Dizonamegilla) dizona* (Engel, 2009)	Bingham and Morley, 1897
4	*Amegilla (Glossamegilla) himalajensis* (Radoszkowski, 1882)	Ascher and Pickering, 2022
5	*Amegilla (Glossamegilla) violacea* (Lepeletier, 1841)	Ascher and Pickering, 2022
6	*Amegilla (Zonamegilla) niveocincta* (Smith, 1854)	Ascher and Pickering, 2022
7	*Amegilla (Zonamegilla) zonata* (Linnaeus, 1758)	Layek *et al*., 2021; Saini *et al*., 2018
8	*Elaphropoda nuda* (Radoszkowski, 1882)	Saini *et al*., 2021
9	*Habropoda krishna* (Bingham, 1908)	Ascher and Pickering, 2022
10	*Habropoda radoszkowskii* (Dalla Torre, 1896)	Ascher and Pickering, 2022
	Tribe- Apini	
11	*Apis (Apis) cerana* (Fabricius, 1793)	Ascher and Pickering, 2022
12	*Apis (Apis) mellifera* (Linnaeus, 1758)	Ascher and Pickering, 2022
13	*Apis (Megapis) dorsata* (Fabricius, 1793)	Ascher and Pickering, 2022
14	*Apis (Megapis) laboriosa* (Smith, 1871)	Ascher and Pickering, 2022
15	*Apis (Micrapis) andreniformis* (Smith, 1858)	Ascher and Pickering, 2022
16	*Apis (Micrapis) florea* (Fabricius, 1787)	Ascher and Pickering, 2022
	Tribe- Bombini	
17	*Bombus (Megabombus) albopleuralis* (Friese, 1916)	Willams, 2022
18	*Bombus (Alpigenobombus) breviceps* (Smith, 1852)	Ascher and Pickering, 2022
19	*Bombus (Alpigenobombus) genalis* (Friese, 1918)	Ascher and Pickering, 2022
20	*Bombus (Bombus) tunicatus* (Smith, 1852)	Ascher and Pickering, 2022
21	*Bombus parthenius* (Richards, 1934)	Willams, 2022
22	*Bombus (Melanobombus) eximius* (Smith, 1852)	Ascher and Pickering, 2022
23	*Bombus (Melanobombus) festivus* (Smith, 1861)	Ascher and Pickering, 2022
24	*Bombus (Orientalibombus) funerarius* (Smith, 1852)	Ascher and Pickering, 2022
25	*Bombus (Orientalibombus) haemorrhoidalis* (Smith, 1852)	Ascher and Pickering, 2022
26	*Bombus (Pyrobombus) abnormis* (Tkalců, 1968)	Ascher and Pickering, 2022
27	*Bombus (Pyrobombus) flavescens* (Smith, 1852)	Ascher and Pickering, 2022
28	*Bombus (Pyrobombus) luteipes* (Richards, 1934)	Ascher and Pickering, 2022
29	*Bombus (Pyrobombus) pressus* (Frison, 1935)	Ascher and Pickering, 2022

30	*Bombus (Pyrobombus) rotundiceps* (Friese, 1916)	Ascher and Pickering, 2022
	Tribe- Melectini	
31	*Tetralonioidella himalayana* (Bingham, 1897)	Chandra *et al.*, 2021
32	*Thyreus himalayensis* (Radoszkowski, 1893)	Ascher and Pickering, 2022
33	*Thyreus histrio* (Fabricius, 1775)	Ascher and Pickering, 2022
34	*Thyreus massuri* (Radoszkowski, 1893)	Ascher and Pickering, 2022
35	*Thyreus novaehollandiae* (Lepeletier, 1841)	Ascher and Pickering, 2022
36	*Thyreus praestans* (Lieftinck, 1962)	Ascher and Pickering, 2022
37	*Thyreus smithii* (Dalla Torre, 1896)	Ascher and Pickering, 2022
38	*Thyreus surniculus* (Lieftinck, 1959)	Ascher and Pickering, 2022
39	*Thyreus takaonis* (Cockerell, 1911)	Ascher and Pickering, 2022
	Tribe- Meliponini	
40	*Lepidotrigona arcifera* (Cockerell, 1929)	Ascher and Pickering, 2022
41	*Tetragonula (Tetragonula) bengalensis* (Cameron, 1897)	Ascher and Pickering, 2022
42	*Tetragonula (Tetragonula) iridipennis* (Smith, 1854)	Chandra *et al.*, 2021
	Tribe- Nomadini	
43	*Nomada adusta* (Smith, 1875)	Ascher and Pickering, 2022
44	*Nomada turneri* (Meade-Waldo, 1913)	Ascher and Pickering, 2022
	Subfamily- Xylocopinae **Tribe- Allodapini**	
45	*Braunsapis mixta* (Smith, 1852)	Ascher and Pickering, 2022
46	*Braunsapis puangensis* (Cockerell, 1929)	Ascher and Pickering, 2022
47	*Braunsapis picitarsis* (Cameron, 1902)	Chandra *et al.*, 2022
	Tribe- Ceratinini	
48	*Ceratina bhawani* (Bingham, 1908)	Ascher and Pickering, 2022
49	*Ceratina (Ceratinidia) compacta* (Smith, 1879)	New record
50	*Ceratina (Ceratinidia) hieroglyphica* (Smith, 1854)	Ascher and Pickering, 2022
51	*Ceratina (Pithitis) binghami* (Cockerell, 1908)	Ascher and Pickering, 2022
	Tribe- Xylocopini	
52	*Xylocopa (Biluna) auripennis* (Lepeletier, 1841)	Ascher and Pickering, 2022
53	*Xylocopa (Biluna) nasalis* (Westwood, 1842)	Ascher and Pickering, 2022
54	*Xylocopa (Biluna) tranquebarorum* (Swederus, 1787)	Ascher and Pickering, 2022
55	*Xylocopa (Ctenoxylocopa) fenestrata* (Fabricius, 1798)	Ascher and Pickering, 2022
56	*Xylocopa (Hoploxylocopa) acutipennis* (Smith, 1854)	Ascher and Pickering, 2022
57	*Xylocopa (Koptortosoma) aestuans* (Linnaeus, 1758)	Ascher and Pickering, 2022
58	*Xylocopa (Koptortosoma) flavonigrescens* (Smith, 1854)	Ascher and Pickering, 2022
59	*Xylocopa (Koptortosoma) pubescens* (Spinola, 1838)	Ascher and Pickering, 2022
60	*Xylocopa (Koptortosoma) ruficornis* (Fabricius, 1804)	Ascher and Pickering, 2022
61	*Xylocopa (Maaiana) bentoni* (Cockerell, 1919)	Ascher and Pickering, 2022
62	*Xylocopa (Nyctomelitta) tranquebarica* (Fabricius, 1804)	Ascher and Pickering, 2022
63	*Xylocopa (Platynopoda) latipes* (Drury, 1773)	Ascher and Pickering, 2022
64	*Xylocopa (Platynopoda) magnifica* (Cockerell, 1929)	Ascher and Pickering, 2022
65	*Xylocopa (Platynopoda) tenuiscapa* (Westwood, 1840)	Ascher and Pickering, 2022
66	*Xylocopa (Zonohirsuta) dejeanii* (Lepeletier, 1841)	Ascher and Pickering, 2022
	Family – Colletidae **Subfamily- Hylaeinae**	
67	*Hylaeus basimacula* (Cameron, 1904)	Ascher and Pickering, 2022
68	*Hylaeus (Indialaeus) bellicosus* (Cameron, 1897)	Ascher and Pickering, 2022
69	*Hylaeus (Indialaeus) strenuus* (Cameron, 1897)	Ascher and Pickering, 2022
70	*Hylaeus (Prosopis) montanus* (Nurse, 1903)	Ascher and Pickering, 2022

	Family – Halictidae **Subfamily- Halictinae** **Tribe- Halictini**	
71	*Halictus acrocephalus* (Blüthgen, 1926)	Layek *et al.*, 2021
72	*Halictus (Seladonia) lucidipennis* (Smith, 1853)	Ascher and Pickering, 2022
73	*Halictus (Seladonia) propinquus* (Smith, 1853)	Ascher and Pickering, 2022
74	*Lasioglossum (Ctenonomia) albescens* (Smith, 1853)	Ascher and Pickering, 2022
75	*Lasioglossum (Ctenonomia) ciris* (Cameron, 1897)	Ascher and Pickering, 2022
76	*Lasioglossum (Ctenonomia) compressum* (Blüthgen, 1926)	Ascher and Pickering, 2022
77	*Lasioglossum (Ctenonomia) pashokense* (Blüthgen, 1926)	Ascher and Pickering, 2022
78	*Lasioglossum (Ctenonomia) sikkimense* (Blüthgen, 1926)	Ascher and Pickering, 2022
79	*Lasioglossum (Ctenonomia) splendidulum* (Vachal, 1895)	Chandra *et al.*, 2021
80	*Lasioglossum (Dialictus) sanitarium* (Blüthgen, 1926)	Ascher and Pickering, 2022
81	*Lasioglossum (Evylaeus) funebre* (Cameron, 1897)	Ascher and Pickering, 2022
82	*Lasioglossum (Evylaeus) pseudopalmeri* (Blüthgen, 1926)	Ascher and Pickering, 2022
83	*Lasioglossum (Evylaeus) salutatrix* (Cameron, 1897)	Ascher and Pickering, 2022
84	*Lasioglossum (Hemihalictus) cavillosum* (Vachal, 1895)	Ascher and Pickering, 2022
85	*Lasioglossum (Hemihalictus) eduardi* (Blüthgen, 1931)	Ascher and Pickering, 2022
86	*Lasioglossum (Leuchalictus) dynastes* (Bingham, 1898)	Ascher and Pickering, 2022
87	*Lasioglossum (Sphecodogastra) perihirtulum* (Cockerell, 1937)	Ascher and Pickering, 2022
88	*Patellapis (Pachyhalictus) interstitialis* (Cameron, 1903)	Ascher and Pickering, 2022
89	*Sphecodes crassicornis* (Smith, 1879)	Ascher and Pickering, 2022; Bingham and Morley, 1897
90	*Sphecodes chaprensis* (Blüthgen, 1927)	Rajkumar and Dey, 2016
91	*Thrinchostoma wroughtoni* (Cameron, 1897)	Bingham and Morley, 1897
	Subfamily- Nomiinae **Tribe- Nomiini**	
92	*Lipotriches (Austronomia) albofimbriata* (Cameron, 1902)	Ascher and Pickering, 2022
93	*Lipotriches (Austronomia) scutellata* (Smith, 1875)	Ascher and Pickering, 2022
94	*Lipotriches (Lipotriches) fulvinerva* (Cameron, 1907)	Ascher and Pickering, 2022
95	*Lipotriches (Lipotriches) phenacopsis* (Cockerell, 1911)	Majumder *et al.*, 2021
96	*Lipotriches (Rhopalomelissa) pulchriventris* (Cameron, 1897)	Ascher and Pickering, 2022
97	*Nomia (Acunomia) iridescens* (Smith, 1857)	Ascher and Pickering, 2022
98	*Nomia (Acunomia) strigata* (Fabricius, 1793)	Ascher and Pickering, 2022; Bhattacharyya *et al.*, 2019
99	*Nomia (Crocisaspidia) buddha* (Westwood, 1875)	Ascher and Pickering, 2022
100	*Nomia (Gnathonomia) thoracica* (Smith, 1875)	Ascher and Pickering, 2022
101	*Nomia (Hoplonomia) elliotii* (Smith, 1875)	Ascher and Pickering, 2022
102	*Nomia (Hoplonomia) westwoodi* (Gribodo, 1894)	Ascher and Pickering, 2022
103	*Nomia (Maculonomia) anthophoroides* (Meade-Waldo, 1916)	Ascher and Pickering, 2022
104	*Nomia (Nomia) curvipes* (Fabricius, 1793)	Ascher and Pickering, 2022
105	*Pseudapis (Pseudapis) oxybeloides* (Smith, 1875)	Ascher and Pickering, 2022
106	*Steganomus bipunctatus* (Fabricius, 1804)	Ascher and Pickering, 2022

107	*Steganomus lieftincki* (Pauly, 2009)	Ascher and Pickering, 2022
108	*Steganomus nodicornis* (Smith, 1875)	Dover, 1921
	Family – Megachilidae **Subfamily- Megachilinae** **Tribe- Anthidiini**	
109	*Anthidiellum (Pycnanthidium) rasorium* (Smith, 1875)	Ascher and Pickering, 2022
110	*Bathanthidium (Manthidium) binghami* (Friese, 1901)	Sardar *et al*., 2022
111	*Euaspis carbonaria* (Smith, 1854)	Ascher and Pickering, 2022
112	*Euaspis edentata* (Baker, 1995)	Ascher and Pickering, 2022
113	*Stelis bengala* (Warncke, 1992)	Ascher and Pickering, 2022
114	*Trachusa longicornis* (Friese, 1902)	Ascher and Pickering, 2022
	Tribe- Megachilini	
115	*Coelioxys (Allocoelioxys) capitatus* (Smith, 1854)	Bingham and Morley, 1897
116	*Coelioxys (Allocoelioxys) cuneatus* (Smith, 1875)	Ascher and Pickering, 2022
117	*Coelioxys (Callosarissa) confusus* (Smith, 1875)	Ascher and Pickering, 2022
118	*Coelioxys (Liothyrapis) apicatus* (Smith, 1854)	Ascher and Pickering, 2022
119	*Coelioxys (Liothyrapis) decipiens* (Spinola, 1838)	Chandra *et al*., 2021
120	*Coelioxys (Torridapis) fenestratus* (Smith, 1873)	Ascher and Pickering, 2022
121	*Coelioxys (Allocoelioxys) fuscipennis* (Smith, 1854)	Dover, 1921
122	*Heriades (Michenerella) parvula* (Bingham, 1897)	Chandra *et al*., 2021
123	*Megachile (Aethomegachile) laticeps* (Smith, 1853)	Sardar *et al*., 2021
124	*Megachile (Amegachile) bicolor* (Fabricius, 1781)	Chandra *et al*., 2021
125	*Megachile (Callomegachile) cephalotes* (Smith, 1853)	Chandra *et al*., 2021
126	*Megachile (Aethomegachile) conjuncta* (Smith, 1853)	Kumari *et al*., 2018
127	*Megachile (Callomegachile) disjuncta* (Fabricius, 1781)	Ascher and Pickering, 2022; Sardar *et al*., 2021
128	*Megachile* (*Callomegachile*) *monticola* (Smith, 1853)	Chandra *et al*., 2022
129	*Megachile (Callomegachile) relata* (Smith, 1879)	Chandra *et al*., 2021
130	*Megachile (Callomegachile) umbripennis* (Smith, 1853)	New record
131	*Megachile (Eutricharaea) coelioxysides* (Bingham, 1898)	Sardar *et al*., 2021
132	*Megachile (Eutricharaea) gathela* (Cameron, 1908)	Chandra *et al*., 2021
133	*Megachile (Eutricharaea) hera* (Bingham, 1897)	Gupta, 2013
134	*Megachile (Eutricharaea) vera* (Nurse, 1901)	Sardar *et al*., 2021
135	*Megachile femoratella* (Cockerell, 1918)	Ascher and Pickering, 2022
136	*Megachile (Pseudomegachile) lanata* (Fabricius, 1775)	Sardar *et al*., 2021
137	*Megachile (Xanthosarus) anthracina* (Smith, 1853)	Bingham and Morley, 1897

New state reports

Based on the present study, two bee species viz., *Ceratina (Ceratinidia) compacta* (Family- Apidae) and *Megachile (Callomegachile) umbripennis* (Family- Megachilidae) are reported for the first time from West Bengal, India.

Taxonomy Family **APIDAE**
Subfamily **XYLOCOPINAE**
Tribe **Ceratinini**
Genus ***Ceratina*** Latreille, 1802

I. Subgenus ***Ceratinidia*** (Cockerell and Porter, 1899)

1. ***Ceratina (Ceratinidia) compacta*** (Smith, 1879)

Synonyms- *Ceratina philippinensis* Ashmead, 1904

Material examined: 01 ♂, India, West Bengal, Batanagar, 22°30′47″N 88°13′03″E, 27.ix.2021, sweep net, coll. D. Dey; 01 ♀, India, West Bengal, Batanagar, 22°30′47″N 88°13′03″E, 27.ix.2021, sweep net, coll. D. Dey; 01 ♀, India, West Bengal, Batanagar, 22°30′40″N 88°13′18″E, 06.xi.2021, sweep net, coll. D. Dey; 01 ♀, India, West Bengal, Batanagar, 22°30′40″N 88°13′18″E, 06.xi.2021, sweep net, coll. D. Dey; 01 ♀, India, West Bengal, Batanagar, 22°30′40″N 88°13′18″E, 01.xii.2021, sweep net, coll. D.

Dey; 01 ♀, India, West Bengal, Batanagar, 22°30′41″N 88°13′19″E, 26.xii.2021, sweep net, coll. D. Dey.

Distribution: India: Uttarakhand (Khan and Yogi, 2020) and West Bengal (new record).

Elsewhere: Bangladesh, China, Hong Kong, Thailand, Malaysia, Indonesia, Philippines (Ascher and Pickering, 2022).

Floral associations in India: *Cajanus cajan* (Fabaceae), *Helianthus annuus* (Asteraceae), *Brassica juncea* (Brassicaceae), *Luffa* sp. (Cucurbitaceae) (Yogi and Khan, 2020); *Anisomeles indica* (Lamiaceae), *Sphagneticola trilobata*, *Tridax procumbens*, *Chromolaena odorata* (Asteraceae) (Present study).

Family **MEGACHILIDAE**
Subfamily **MEGACHILINAE**
Tribe **Megachilini**
Genus ***Megachile***
II. Subgenus ***Callomegachile*** (Michener, 2007)

2. *Megachile (Callomegachile) umbripennis* (Smith, 1853)

Synonyms- *Megachile schauinslandi* (Alfken, 1898); *Megachile domesticum* (Perkins, 1899), nomen nudum; *Megachile umbripennis* var *atriventris*_homonym (Friese, 1903); *Megachile aureobasis* (Cockerell, 1919); *Megachile (Eumegachile) umbripennis* (Smith, 1853); *Chalicodoma (Callomegachile) umbripenne* (Smith, 1853)

Material examined: 01 ♀, India, West Bengal, Batanagar, 22°30′40″N 88°13′18″E, 06.xi.2021, sweep net, coll. D. Dey; 01 ♀, India, West Bengal, Batanagar, 22°30′40″N 88°13′18″E, 26.xi.2021, sweep net, coll. D. Dey; 01 ♀, India, West Bengal, Batanagar, 22°30′40″N 88°13′18″E, 26.xi.2021, sweep net, coll. D. Dey; 01 ♂, India, West Bengal, Howrah: Shibpur: Acharya Jagadish Chandra Bose Indian Botanic Garden, 22°33′25″N 88°17′55″E, 23.xi.2021, sweep net, coll. D. Dey; 01 ♀, India, West Bengal, Howrah: Shibpur: Acharya Jagadish Chandra Bose Indian Botanic Garden, 22°33′25″N 88°17′55″E, 03.xii.2021, sweep net, coll. D. Dey; 01 ♂, India, West Bengal, Batanagar, 22°30′41″N 88°13′19″E, 14.xii.2021, sweep net, coll. D. Dey; 01 ♂, India, West Bengal, Batanagar, 22°30′41″N 88°13′19″E, 14.xii.2021, sweep net, coll. D. Dey; 01 ♂, India, West Bengal, Batanagar, 22°30′41″N 88°13′19″E, 26.xii.2021, sweep net, coll. D. Dey.

Distribution: India: Himachal Pradesh, Punjab, Haryana, Chandigarh, Gujarat, Rajasthan, Tamil Nadu, Arunachal Pradesh, Sikkim (Saini *et al*., 2018) and West Bengal (New record).

Elsewhere: Sri Lanka, Nepal, Bangladesh, Myanmar, China, Hong Kong, Thailand, Laos, Vietnam, Malaysia, Singapore, Cook Islands, France, USA (Ascher and Pickering, 2022).

Floral associations in India: *Bauhinia tomentosa, Lupinus perennis, Consolida ajacis, Vigna radiata, Vigna mungo, Justicia gengarussa, Pongamia pinnata, Cosmos sulphurous, Tanacetum cinerarifolium, Dalbergia latifolia, Salvia viridis, Bauhinia acuminata, Caesalpinia pulcherrima, Cajanus cajan* (Fabaceae), *Cuphea hyssopifolia* (Kunjwal *et al*., 2021); *Anisomeles indica* (Lamiaceae), *Asystasia indica* (Acanthaceae), *Chromolaena odorata* (Asteraceae) (Present study).

Discussion

Among the 137 bee species of West Bengal, 12 species viz., *Hylaeus (Indialaeus) bellicosus* Cameron, 1897, *Hylaeus basimacula* Cameron, 1904, *Lasioglossum (Ctenonomia) pashokense* Blüthgen, 1926, *Patellapis (Pachyhalictus) interstitialis* Cameron, 1903, *Thrinchostoma wroughtoni* Cameron, 1897, *Lipotriches (Austronomia) albofimbriata* Cameron, 1902, *Lipotriches (Austronomia) scutellata* Smith, 1875, *Nomia (Maculonomia) anthophoroides* Meade-Waldo, 1916, *Stelis bengala* Warncke, 1992, *Coelioxys (Torridapis) fenestratus* Smith, 1873, *Thyreus novaehollandiae* Lepeletier, 1841, *Thyreus praestans* Lieftinck, 1962, are reported exclusively from West Bengal only.

The present study also adds new records of two bee species to West Bengal, India. Till date *Ceratina compacta* is known

Figure 4: Field photograph of *C. compacta*

Figure 5: Microscopic profile image of *C. compacta* (dorsal view)

Figure 6: Field photograph of *M. umbripennis*

Figure 7: Microscopic profile image of *M. umbripennis* (dorsal view)

only from the state of Uttarakhand, India. Khan and Yogi (2020) reported for the first time the presence of *C. compacta* in India which portrayed the range expansion of the bee species in Asian countries.

The current study, also reports the leafcutter bee *Megachile umbripennis* from West Bengal for the first time. *M. umbripennis* is widely distributed in South East Asian countries as well as the different Indian states (Ascher and Pickering, 2022).

The present study could observe *M. umbripennis* foraging on the native plants like *Anisomeles indica* and *Asystasia indica* during the month of November. While in December *M. umbripennis* was observed visiting flowers of the invasive alien plant species *Chromolaena odorata*. The native plant *Anisomeles indica* and the invasive *Chromolaena odorata* co-occurred at the study site of Batanagar but *C. odorata* only started flowering in late November while *Anisomeles indica* had already set seed and flowering was very sparse with higher sporadicity. An interesting observation is worth mentioning here. Visits by *M. umbripennis* to both the flowering plant species and their flowering period suggest that the invasive plant serves as an important alternative floral resource when the native plant is not flowering.

To maintain the flow of effective pollination services, the management and conservation of bee species are essential and it can primarily be achieved by obtaining ample knowledge on their distribution. Research lacuna regarding habitat requirements, ecological interaction of these pollinators need to be addressed. This study provides first line of information on bees of West Bengal, which will help in their future research and conservation.

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